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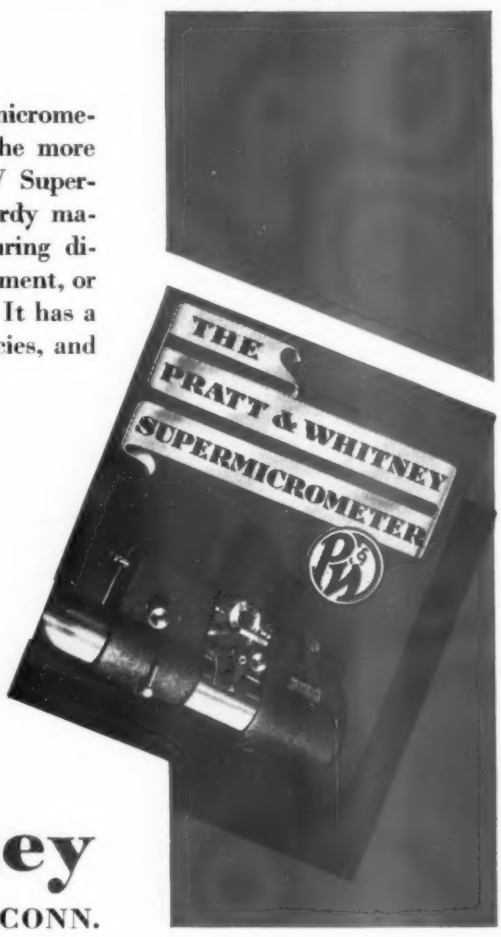

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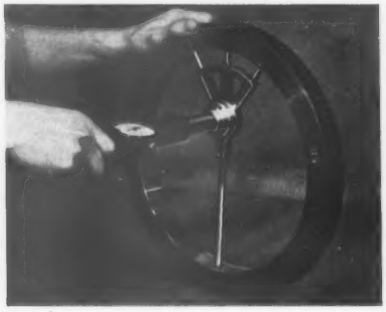

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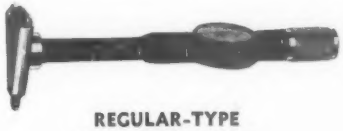

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Vol. VII JANUARY, 1939 No. 9

Contents

NEWS

Production Perspectives — News of Mass Manufacturing from Everywhere 18
Chapter Doings 20

GENERAL

Machine & Tool Progress Exhibition, Report of Officials Indicates Success 17

EDITORIAL

Machine Bondage, by W. J. Cameron 7

TECHNICAL

Is the Refinement of Production Machinery Obsoleting Factory Workers at 40? by O. B. Jones 9
Tool Engineers Must Qualify for Greater Responsibilities, by Don Flater . 11
Industrial Advance Through Scientific Research, by L. W. Chubb . . . 12

A.S.T.E.

January Meeting Announcements 16
Chapter Doings 20

FEATURES

Handy Andy's Workshop 24
New Equipment 32

ADVERTISERS' INDEX 50

Walter F. Wagner, President

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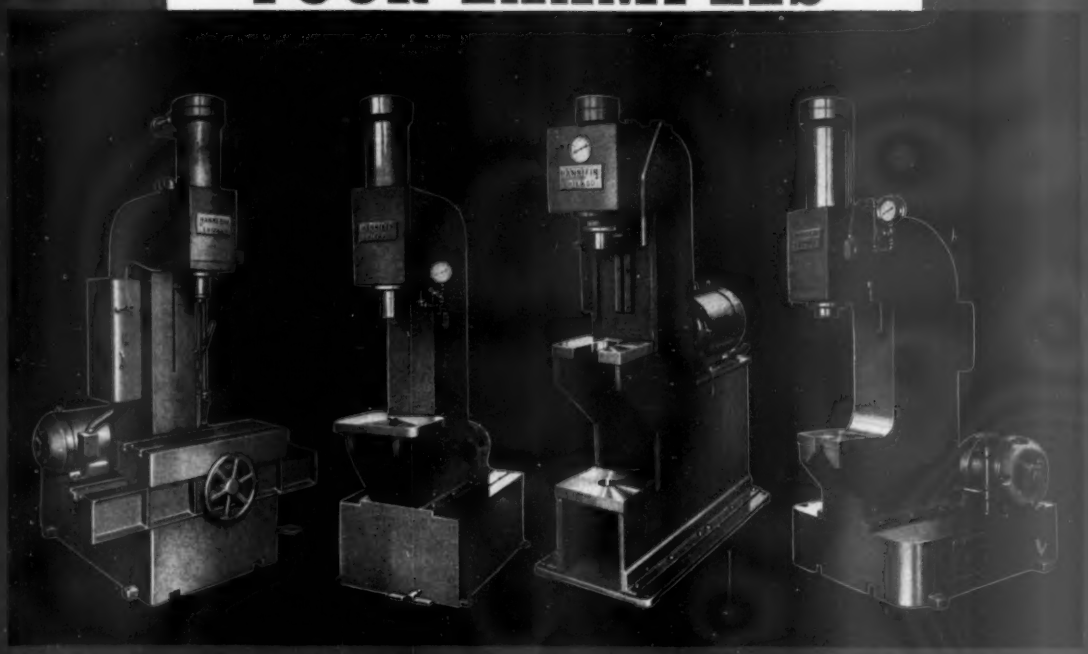

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MACHINE BONDAGE

By

W. J. CAMERON

FORD MOTOR COMPANY

A RECENT academic conference overseas announced its intention "to rescue man from his bondage to a machine-made civilization." Now, these words may have meaning, but one searches in vain for it. What is this bondage? Why do bookmen find the machine so repugnant? They like its results—none more. The machine made their conference possible—by air and land and water it transported them to the place of meeting. It prints their books. It is the instrument of much of their science. It provides the refinements of their colleges and homes. It liberates their time and supports them in their work. They speak of "bondage," but give no specific instance of their bondage to the machine.

It may be they are thinking of those who work for wages—perhaps among them this "bondage" exists. Again—where is it? Where do the bonds of the machine fasten themselves on life? There was plenty of bondage in work before the machine came. People were bound to their work for 12 or 15 hours a day. If there were 10 in a family, all 10 were compelled to work to gain a living. Hands were the principal tools, and most of the power was supplied by muscle. No free hours. No home freedom for wives or children. No freedom from heavy physical burdens. Bondage was almost complete. Then, in due time, came the machine. Seven hours each working-day have since been freed of bondage. The machine enables the labor of one person to support a family. Generations of children have been given the freedom of childhood. Mothers, liberated by the machine from labor-bondage, are left free to make a home. The machine has done the work of hands and muscles, has released the worker from physical stress and strain. Less time and labor, more income, a free family—all these the beneficial fruit of the machine! Where is the bondage?

Here is a famous cleric in an eastern city; he lives in a modern house; machine-generated electricity is a silent servant everywhere; his every want is instantly met by some machine-made service. The telephone saves him time; dictaphone or typing machine saves him labor. On Sunday morning he steps into his machine-made motor car, which is also a machine, that carries him speedily and comfortably to the magnificent edifice where he officiates, and there, under the soaring pipes of a machine-made and machine-operated organ, he steps to the microphone, and through a score of stations filled with radio engineers and radio machinery he utters his eloquent denunciation of the machine age! It is a curiously contradictory picture, but where is the bondage? Is anything here but a larger freedom?

Then there are those who like to speak of "the complexity of this machine-made civilization." It is a mouth-filling but now much hackneyed phrase, and what is hackneyed is suspect. The whole thing is open to challenge. In the first place, we have no "machine-made civilization"; what we have is a civilization-made machine. The more man masters his environment, the better he makes machines to ease his toil and improve the quality of his work. You can chart his rise in intelligence by the tools he creates. They did not make him, nor do they rule him; he made them and he rules them. Civilization is not produced by the machine, the machine is produced by civilization.

Moreover, this so-called "machine-made civilization" is not "complex"; it moves toward greater simplicity. The pale, inactive critic, out of touch with his times, performs a more complex operation every time his finger flips the page of his book, than the most amazing machine in Christendom can perform. We say Christendom, for it is significant that there the machine has come into fullest flower.

Let us compare what many think of as the old simplicity, with what others call the new complexity. Anyone reared on a back-country farm fifty years ago, will have a fair standard of comparison. Compare the complexity of harnessing a team to go to town fifty years ago, with the simplicity of pushing the starter button of a motor car today. Compare the complexity of lighting a lamp—filling the bowl with kerosene oil, trimming the wick, cleaning the glass chimney, lighting a match, standing by to see that the lamp did not "smoke," and the small weak circle of light you got for all this effort—compare that with the simplicity of switching on an electric lamp that gives you light indeed. Compare the complexity of heating a house fifty years ago—of course, no one heated a house fifty years ago, only two or three rooms—or preparing a meal, or taking a bath, or getting an education, or courting a girl fifty years ago, with the simplicity of these operations today. Hard-tied knots were good but buckles were better, and buttons were simpler than buckles, and zippers are simpler than all. The modern mass-production factory that dazes the unaccustomed beholder is merely a long series of very simple operations connected each with the other for a single purpose.

Life is more filled because we crowd together and do more; it is noisier, but more complex?—no. We go steadily on our way from a sense of complexity born of ignorance and confusion, to a sense of simplicity born of knowledge and confidence.

The above Talk given by Mr. Cameron on the Ford Sunday Evening Hour, December 18th, 1938, is re-printed here through the courtesy and by permission of the Ford Motor Company.

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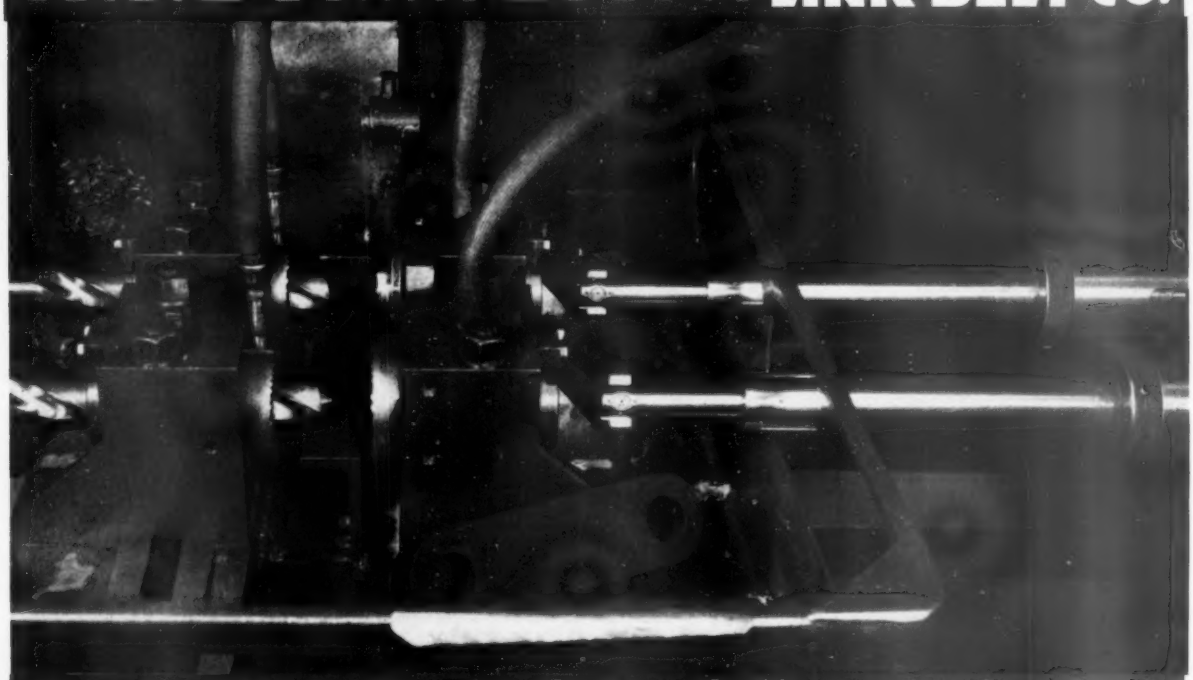

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DAVIS BORING TOOLS

IS THE REFINEMENT OF PRODUCTION MACHINERY OBSOLETING FACTORY WORKERS AT 40?

By

O. B. JONES

FOUNDER,

AMERICAN SOCIETY OF TOOL ENGINEERS

IF YOU want to get the correct answer to any question, just ask Mr. John Q. Public what he thinks about it. Then you begin raking around in just exactly the opposite neck of the woods and there you'll find the truth. In our father's day "common sense" was something to cherish. It's poison today. Many astounding applications of the laws of nature have been dropped into the lap of Mr. John Q. during the past thirty years. He'll tell you frankly he hardly dares doubt or believe whatever he hears or reads until he gets the report of a fact-finding commission. He wanders around mumbling to himself most of the time. Ever so often though, he loses his discretion and talks out loud—quotes some self-styled fact-finding commission's findings.

One of the strange things he's been saying over and over the past ten years is that Walter B. Pitkin is all wrong about a man's life beginning at 40. Odd as it must seem to every Tool Engineer, John Q. thinks the man past 40 isn't getting fair shakes in industry. He's been mumbling repeatedly that men past 40 can't run these new-fangled production machines. Every Tool Engineer knows he's wrong again.

If the Tool Engineers could do what they would like to do they'd take him by the hand and lead him gently to a position in front of the push buttons on one of these Twentieth Century production automatons and let him convince himself that all it takes is clean hands and a pure courageous heart—a level head—and common sense. Just a little push controls and guides the power of all the machines as they click merrily about their task of supplying a pampered race with what it takes to make them more and more unaccustomed to physical work. Johnnie's wife will do more real physical work at home with the electric ironing machine than he will in operating the 5000-ton press which irons out a steel automobile body.

Every production machine is a labor-saving machine. Every machine is a labor-saving machine, as far as the particular task it performs is concerned. Machine design has kept pace with progress in other fields. The physical labor required to operate the production machine has been diminished with each succeeding year. Naturally, since it saves the labor of human beings—and labor is the essence of all value—the product of the machine can be sold for less money than the same product made by human toil. Hence, the more machines, the cheaper the product, the larger the market, the more jobs all along the line and the more happiness for Mr. John Q. God bless him! Some day he'll see it and lay down his monkey wrench.

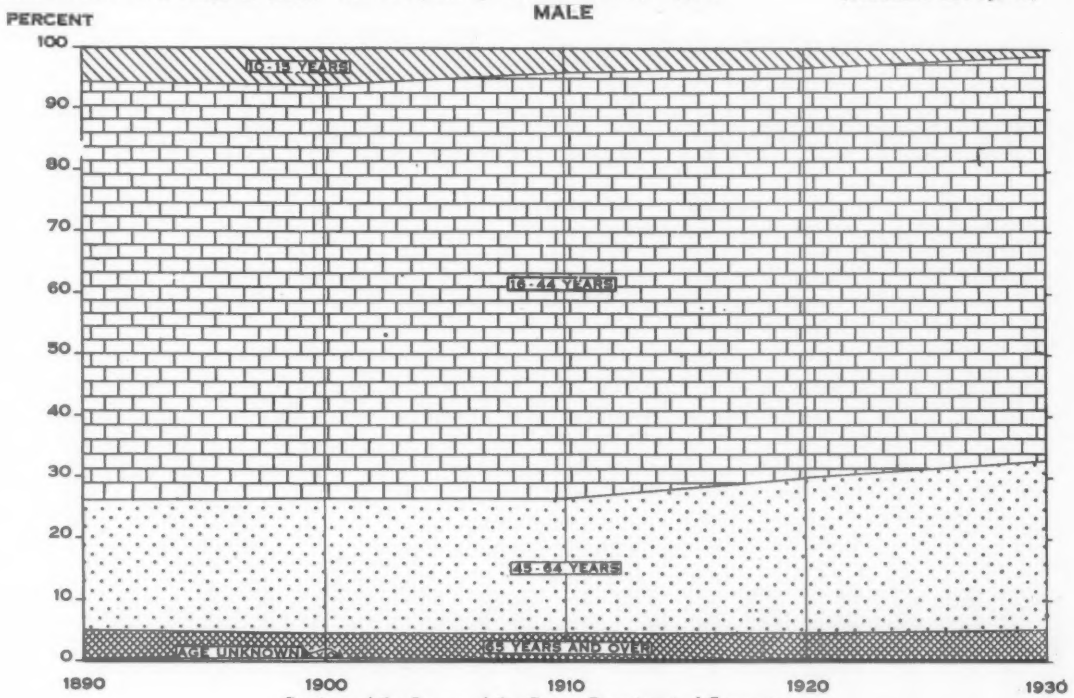
Fact-Finding Reports

Here are some fact-finding commission reports which a lot of Tool Engineers have faith in. The first one I pick up from a table-full is from the U.S. Department of Commerce, Bureau of the Census, Washington, D.C. It is quite new, being released on the morning of October 31, 1938. It is called "Age Composition of the Nation's Labor Force: 1890 to 1930." It's a little 4-page document full of charts and tables and their explanation, so John can understand what it's all about. It's free for the writing so it won't be necessary to republish all of it here.

"Director William L. Austin, of the Bureau of the Census, Department of Commerce, announced today statistics showing the age distribution of the nation's labor force at each Federal census from 1890 to 1930. There were striking changes during the 40-year period ending in 1930 in the proportions of the population in various age groups who were engaged in gainful occupations. These changes were most marked in the youngest and in the oldest age classes. . . . The relative importance of male workers 45 to 64 years old, however, increased gradually from 21.0 per cent of all male workers in 1890 to 27.6 per cent in 1930.

"Median ages show that the nation's

(Continued on Page 41)



Courtesy of the Bureau of the Census Department of Commerce

Plant Foreman Gives low-down

"'Acorn' Dies and 'GREENFIELD' service licked a tough assembly line delay that was causing me a lot of fret and worry . . . and saved my neck at the front office," says this Detroit foreman.

"We were re-threading five 3/32-24 studs on the manifold of every motor as it came down the line. Our dies couldn't stand up to a new heat treatment and the constant changing slowed up the whole line, to say nothing of the cost.

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TOOL ENGINEERS MUST QUALIFY

for Greater Responsibilities

By

DON FLATER

WORKS MANAGER, CHRYSLER DIVISION
CHRYSLER CORPORATION

Introducing Mr. Flater

Mr. Flater has been in the manufacturing business for twenty-two years, with the exception of two years in the U.S. Army during the world war; a portion of this time was spent in automotive work in the motor transport division.

He first entered the manufacturing industry in a large tractor factory, serving, first, as a departmental clerk until enlistment into the U.S. Army.

After returning from France, he again obtained position in the tractor works as gas tank inspector. From this point on he was placed on machines, learning to operate all types, and after a period of years was made set-up man. Eventually he entered the tool room to learn the tool and die trade. In the next few years he served in the capacity as foreman and general foreman of machine shop and assembly.

Realizing the necessity of having a broader field of knowledge, he entered into Tool Engineering work and later branched into machine capacity, efficiency, purchasing of equipment, and plant lay-out. After two years time, he was promoted to Assistant Methods Engineer. After serving in this capacity for some time he was assigned to the lay-out and installation of a large wheel manufacturing plant which involved machining, forge, sheet metal, and foundry practice.

Several years ago he entered the employ of the Chrysler Corporation as Assistant General Superintendent of the machining division at the Chrysler Division Plant, later he was made Time Study Supervisor, and in 1936 became Works Manager of the Chrysler Plant.

D. C. FORSMAN
Technical Editor

ONE of the problems of management in the industrial field today is that of securing competent supervision, engineers, and personnel for other responsible positions. This is not due entirely to lack of persons available who possess, or could possess, the principles required to fill these positions, but is due to lack of outstanding accomplishments on the part of these persons to gain recognition from the management of the fact that they are capable of greater responsibilities. These accomplishments, however, should be of such a nature as to receive recognition on their own merits.

Merit and ability will be recognized but will be scrutinized closely for other "short-comings." One must, at all times, premeditate this scrutiny and eliminate the "short-comings." Concentrated advance thinking along this line will reduce many faults.

Factory Managers are realizing more and more the importance of having a number of men with an engineering education in the organization. It is not absolutely essential that this education be procured in a college, although that is sometimes the best way to obtain it. There are individuals where this way is not the most satisfactory, as the college man does not always absorb beneficial qualifications that the engineer does who comes up the "hard way."

Very often a man must assume responsibilities that require a general knowledge of the different phases in industrial management. If he is only familiar with one step in manufacturing, the man is seriously handicapped due to lack of training and experience.

Any normal individual can better his position and become a success if he has the desire to do so. No set rule will fit all conditions as to what the individual must do, but some suggestions will follow that should be beneficial providing the individual takes an active interest in them and actually uses them to increase his knowledge. It is common to assume that successful people are born, rather than made, but the assumption does not hold.

Qualifications for further success are sometimes acquired through chance or opportunity but never without the initiative, energy, experience, or job knowledge, and the personality to get the most out of the opportunity when it presents itself. The individual must be outstanding in his work and action to get the first foot forward and then carry through.

I believe it fitting that the individual first refresh his memory and replenish his mind with the thoughts that he had when first starting out in the industrial world; the ambition, the interest created in him by the job, and the determination to be a success in the business. These thoughts must never be allowed to recede if he is to eventually become successful and maintain the standard of success that he has set for himself.

Before starting out to gain further experience and improve your capacity for further responsibilities, be certain, by self analysis, that you possess the ability to: (a) obtain authentic facts, (b) get all facts having any bearing on the subject, (c) be able to draw definite conclusions from these facts, and (d) be tactful enough to use the abilities of the man "who knows." You must be able to understand human nature and conduct your actions accordingly.

The opportunity to obtain manufacturing experience is available in Tool Engineering work and only awaits the individual's desire and ambition to go out and obtain it through the contacts available.

Some of these contacts carry a wealth of information and should arouse your ambition to the point of investigation, proving that your assumptions and ideas are working out. Available sources of information usually are Time Study, Tool Cost Records, Scrap Reports, Production Records, Metallurgical and Chemical Laboratories, Plant Engineering, and Material Handling Methods.

The above divisions weave in very closely with Tool Engineering work and the manner how, together with their importance, will be covered in a later item.

Another important item is the opportunity to talk to other engineers and exchange views, together with information gained by the visiting of other manufacturing plants. Your affiliations with executives and production men are a fine source of information, and a detailed study by yourself of men who are successful, to see "how" they do things and apply this "how" to yourself affords unlimited advantages. The factory in which you work is always wide open for you to see how every phase of manufacturing is carried on.

Various business journals, magazines, and books are always available for study, together with knowledge gained in a tool society.

Since the above information is available for you to increase your technical and job knowledge, other essentials required for advancement must be given consideration, such as, personality, appearance, initiative, ambition, observation, and ability to co-operate. We will not dwell upon these at this time as each is up to the individual himself to develop through observation, study and conscious application to one's self to make them become a habit. Further details to assist you in covering these self-made essentials will be discussed in later articles.

Now that the above advantages have been pointed out as being available to the Tool Engineer, it appears that every opportunity exists in our line of work to study and become thoroughly familiar with the personal qualifications required for industrial management to assist in your advancement and success.

INDUSTRIAL ADVANCE

SCIENTIFIC research has had a profound effect on our industrial and economic life, and I would like to point out the role of industrial research in steel, why and how it is done, and review some of the developments that may be of interest to Tool Engineers.

Science, as we know it today, played no important part in the advancement of civilization until modern times. Until recently all advancement in manufacturing and industrial activities were slow. For generations they were carried on by cut and try methods. There were scientists in the old days but they had to work under cover because any new knowledge or theory was considered heresy. Only in the last few generations, since science was encouraged, has there been any real advancement in civilization. It has been only in the last several generations that science has come in with knowledge. There were many new inventions in the nineteenth century, and because of the attitude of the public in most cases they were ridiculed.

When the Wright Brothers flew at Kittyhawk it was looked upon as a wonderful achievement, but the papers and the public saw nothing practical in the accomplishment. When the automobile started it was laughed at as comical and useless. When Westinghouse proposed his airbrake they said, "The man is crazy to think he can stop a train with wind."

In some cases they suffered more than ridicule as shown from the following, taken from a Boston paper at the time Bell was trying to raise capital to exploit his telephone: "A man about forty-six years of age giving the name of Joshua Coppersmith has been arrested for trying to raise funds by exhibiting a device which he says will convey the voice any distance over a metallic wire so it will be heard at the other end. He calls it the 'telephone' which is obviously taken from 'telegraph' and win the confidence of people without their understanding the principles on which it is based. Well-informed people know that it is impossible to transmit the voice over wires as it is done with dots and dashes over the Morse code, and if it were possible to do so the thing would be of no practical value." It goes on and congratulates the authorities for arresting this criminal.

Science and the Mode of Living

Now is it any wonder that scientific advancements two or three generations ago were so slow considering the attitude of the public? In spite of the attitude of the public the great inventions of the nineteenth century were finally applied. They completely changed our mode of living.

With improved transportation, methods of communication, and organized industry there was a feeling that the world had been completed, that everything had been found out. Scientific education in our schools was reduced to a routine of teaching the laws of nature, physics, chemistry.

The statement was made in the 1894 Year Book of one of our leading colleges, which states, "The determinations of the value of physical constants," and some of these remarks demonstrate the psychology of the times. All we could look forward to was to know a little more than the other fellow and work our way to the top and be in one of the commanding industries. When some of us started thirty years ago it seemed that the application of the fundamental knowledge had been completed. We had motors, machines, tools, lamps, all kinds of things we needed to do what should be done.

Most of you find that industry develops not more slowly but at an increased rate. You have seen new machines come to us, new appliances, new methods of fabrication, and have seen great improvements and changes in those that already existed. Now, one entering business goes in with the idea that there is more to know than any one man can master. Things are becoming increasingly specialized and he expects new developments, new things to come rapidly.

The old feeling of stagnation has disappeared not only for the technical man but in all branches of society. The people look for and expect scientific advances. There are lots of opinions as to how the world advances. Some think of the great developments of inventions as strictly accidental. In many cases they are accidental, but there is a background for them all. Ideas ripen consciously because of what has gone before. I like to compare scientific improvement with the jigsaw puzzle. A piece fits in with what has been done. It compares with the picture detail, the color, and will make it grow piece by piece in small portions or areas. Now and then one will find the piece that will join the parts together or one worker will find how the frontier of two large areas get together. The picture frame pieces have straight edges and the segments of the frontiers help their placement. In our previous search for knowledge we knew not where the frontiers were. Certainly the 1890 ideas were all wrong. Most of the constants of that time have been replaced and we realize we know very little of hidden secrets of nature. Discoveries and developments and new inventions are increasing at an astonishing rate.

Progress Through Science

The great progress comes through the science in the various universities and various scientific foundations and the team work in the industrial laboratories. Such a sequence of obtaining new knowledge and the utilization of it by engineers is rapidly pushing out the frontiers of industry. Now the research laboratories of a manufacturing company have a threefold purpose: To improve and reduce the cost of going production; the development of new things; and to do advance work which will increase our knowledge and perhaps later on have practical application in new fields. Scientific industrial research laboratories are usually kept apart from the several engineering departments and control laboratories so that the investigational work can be carried on independently of the usual design and development. Many of the research laboratories, of course, cooperate closely with the engineering departments and the shops. Particularly is this true in connection with minor problems for eliminating troubles, developing new processes and materials and new design data. The majority of the work is of the practical kind with the view of making early application.

The strictly fundamental work in the frontiers of science is carried on merely to obtain knowledge and without any application in view. The long series of complicated investigations required work in several branches of the sciences, particularly chemistry, metallurgy, fabrication, and so on. Scientists working in the fields sometimes overlap one another. Many problems overlap and many solutions find multiple application. Through this scientific research the progress is made better, more efficient, and more durable.

Metal fabrications as used today are now so radically different than those used a few years back that one who does not keep in touch with the shop processes and activities can hardly recognize the activities and products when going through the plant. By tracing the development of almost any

Through Scientific Research

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article or machine aro· ıd you it will be evident that it is the re ılt of a compilation of ideas, process ., and developments. From so many directions that a complete history of family tree of the machine would be extremely complicated. When you realize this I am sure that you will realize that more ideas, machines, and materials will be needed for the future progress. It would take literally volumes to trace even such an item as an automatic machine tool or a simple device and include all the contributions involved.

Need for Patent System

Going hand in hand with scientific research is the question of patent protection. At this point I would like to say that a great deal of our progress in America can be credited to our patent system. It costs money to develop and exploit new things, new inventions, and the protection by the patent claims gives the incentive to work out new things. Under such production the products of research can be exploited for a long enough term to become established. Without such protection developments and experiments would cease and developments would be surrounded with the greatest secrecy and capital would cease and our comforts and standards of living would be seriously curtailed. At this time we have some bill before Congress to take away our patent protection to reduce the patent monopolies. That would stop the patenting of some labor-saving devices and otherwise experiment with our good American methods. This deserves serious thought and action to save the American industry.

Most of our activities are in the field of electrical manufacturing. However, we have some common interests with Tool Engineers and I would like to outline briefly some of these developments and illustrate how industrial research helps to go forward and look into the future.

First, I am going to mention mechanics. Much pioneering is done in mechanics. This involves experimentation in stress and creep, stress of high temperature, vibration, dynamic, pitting, and galling of gears, plastic phenomena and thermo-dynamics, and many others that sound like a catalogue. This contains much knowledge ready for the designers and is really recognized as of great scientific value. I would like to say something first about the studies on metals at high temperature.

Now I suppose that you all know that any metal under stress at high temperature has a tendency to creep. No matter how low the stress, the creep is there and is a very important consideration in the design of machinery, pipe flow and pressure vessels, particularly steam turbines because under this stress of the steam, centrifugal forces, any growing or lengthening under stress will take up the clearances allowed and give trouble, so that we have to do a good deal of study in creeps.

Now the old long-time creep test has been the standard. That is, we take a sample and we put it at high constant temperature and constant stress and find out how it creeps. The bogey is the creep is usually above 2.10 per cent in twenty years. Now lots of alloys are made and lots are tested but, of course, this is a very slow method, because if you are working to get a life of twenty years you can't very well accentuate the stress. So it means the elongation for a good distance or an enormous number of test machines to take care of the work.

A New Alloy

I might say that we have an alloy that has a creep very, very much less, a very small amount of anything that has been found before. It has enormous strength even at red heat and later on I suppose we can tell more about it. We haven't got all the tests completed yet.

I want to mention stress analysis. Most of you know the use of polarized light and the photoelectric analysis of stresses. If we take a sample made to the shape, say, of an engineering sample and put it under stress in a field of polarized light, fringes form which show the location of all parts that have the same stress.

Now that is an old story, but I am bringing it up because of the new developments. You know in most stress analysis problems you need a third dimension setting. That is, if you test a rail or shaft or something of that kind it isn't in the shape that it would be in practice, and so the solution which we seek is not exactly right. If we must use plane surfaces and take just, say, a section and put it under that stress, so at the laboratories they have developed a new method that gives great promise of getting new solutions of mechanical problems and it has been found that if you take a thing and stress it in the normal way, then these fringes form, and then they can be frozen in the thing by using certain polarizing materials and after they are frozen in there you can scale it off, take the load off, and you can slice pieces out and examine them in any direction and see just what the stresses were at that point.

There is the question of balancing and vibration. Now you all, as mechanical engineers, know that balancing is extremely important to us in the electrical business with high speed motors. It is of the utmost importance to get a good dynamic balance so that a machine will not dance around and make a noise. Now in the laboratories a man had an idea of getting a true dynamic balance very easily. In fact, instead of going through the hours of calculations that are required after taking displacements, he wanted to work out an electrical method that had an electrical brain that would do this for you, and one of the first results is the laboratory machine that was later sent up to our Springfield works, where they have small rotors and I would like to explain it.

The rotor is on two half bearings. Those are on steel strips free to move back and forth. As they move back and forth they move the coil of a metal pickup like the dynamic coil of a loud speaker. As that moves back and forth it generates a voltage to that angular gap. That voltage is fed in a box in the rear for further use. Now the same is true on the other end so that if that rotor is out of good dynamic balance the two shafts will shake in and out and generate a voltage in the coils of certain magnitude and phase position, which will be determined by the unbalance in this rotor. Now I don't know how many of you have studied balance, but there is an old theory in equations if you want a balance in this plane right at the end of one core and the other end of the core either by drilling or by adding weight, you must

find the motion, say, so many points off this shaft and then testing coefficients. Then you are solving equality so that any unbalance at this end will not effect your reading on the left end or any unbalance on the left end in this plane will not effect the right end, now usually to determine the coefficient in mathematics and check that up, but on this machine you set dials in a certain way so that any unbalance on the left will not effect the reading when it is switched to the right and any unbalance in the right will not effect it when it is switched to the left. That means you have set the coefficient and want to get the balance, and I would like to outline the process.

The rotor is put on the bearings and driven by a motor down below. If any unbalance is there, the voltage is fed into an electrical network that has elements in it and amplifiers set that it constantly keeps that problem solved and the output of that network tells you right away how much it is unbalanced on either end. That way it will take to, add from, or subtract weight in these two planes and all you have to do is to throw certain switches, first to get the amount. You throw it up to get the amount on the right end and the left end and the meter reads the exact inch grams of unbalance at that speed. That tells you exactly how much to drill on the right and left end of that core.

But you have got to know where to drill so the machine does that for you too. In other words, these voltages are so fixed in phase relation that they are effected by an amplifier and you run a stroboscopic light there. The stroboscopic light makes the rotor appear as if it were standing still and when you want to know where to drill it indicates where to drill. That is, the rotor is still and you can pick some mark or flyspeck or something to tell it and then you switch to the left and tell how much there.

Now you drill what that thing said and drill it there and the rotor will be in perfect balance. It is remarkably sensitive. You can take a piece of putty very much smaller than a pea, probably a quarter inch diameter, and put it on there and it will definitely show right on the meter.

There is another type of machine in which the bearings are held on certain straps to get the motion and instead of using a stroboscopic light there is a sineway generator on the end, which is combined corresponding to a weight meter of movement which gives you the angle readings, the angle where the drilling should be done. You put a lever on the dial and then you run it again to see that it is all right.

Sometimes we have big machines in the field that run rough and they must be rebalanced. To do that, instead of having this in a resilient mounting we operate on the platform and then on the end of the shaft we put a sineway generator and that can be compounded in a way so that this electric brain or network will work the thing out.

I might say that the biggest rotor that was ever put in service was balanced in a day to a smoothness, well, that was remarkable. You couldn't feel any motion. A job of that kind, if a man had good luck by the old methods would take three weeks.

Take a balancing machine for crank shafts. The crank shaft is interesting. You can't drill anywhere around because the cranks appear at a certain point. Therefore you are compelled to drill only where the cranks make the maximum movement and usually there are four places, if you have four cranks, for your positions. Now the man that developed the original machine also developed the mathematics of general crankcase balance by assuming that you must drill at four positions, four angles at certain positions along the crank shaft. There is a solution where it will give perfect dynamic balance and the electrical net-work continually solves that. In other words all you have to do is put the crank shaft in, spin it with the motor and you have got four drills. You set those four drills one at a time and throw a switch to dial number one and you bring this meter to zero. That sets the drill. Then you set the second and bring it to zero, and do that for all four of them. After you have got the four set you have set a circuit in such a way that when you take that crank shaft out and put it in the next machine it will automatically drill it in those four crank positions so that it will be a perfect dynamic balance. While they are doing that they put a new one in and reset that and speed the thing up.

Before I go on, I would like to say a little about metallurgical research. Metal is rapidly changing from an art to a science. Instead of the old methods in solving statistical research in a field pretty well covered over, theoretical activity in the physics of metals helps us to meet the problem. It helps us develop new alloys to meet demands and to find shortcuts and fabrications in this scientific work.

I would like to show that by studies in heat treatment, special annealing with controlled atmospheres to keep metals right, to control carbonization or decrease carbonization, or not to effect any of these factors. By studying the free energy of gasses and substances in the metals we know the reaction at any temperature and we know what the equilibrium is, and by control of the atmospheres you can get, with certain compositions of atmospheres and certain steels at certain temperatures, the desired effects.

Now this is all coming out of various studies in the physics of metals.

I might mention a very interesting metal we developed in the laboratory, when we were troubled by the shops sending dies up to harden them. We have a certain atmosphere and they send a die up there and it is hardened without any surface carbonization and it can go right in to work with no further machining or grinding or anything else being required.

There are a lot of other features in this physics of metals. They are going down to study the intermolecular forces. I suppose you all know that on the basis of theory our metals ought to be just about ten times as strong as they are, but of course, flaws and impurities in the lattice of the molecular grains has an enormous effect and by these studies we hope very much to improve our metals.

Take an interesting case—the use of an anti-aircraft or shrapnel gun. The fuse is put in the end of the projectile so as to time the explosion of the shell. if the man is up so high you want it to go so many seconds or fractions of a second before the fuse explodes the primer and that is done by a little steel ring that is set before the shell is fired. A clock escapement is run without a spring but by centrifugal weight. There are two weights and as the shell spins around from going through the rifling they act as a clock spring and of course it must be accurately adjusted so that it will operate at just the right time according to the second.

Now the total life of these things is thirty seconds so to calibrate that is quite a job. You have got to spin that thing at 16,000 or 12,000 R.P.M.'s. There are two kinds of guns, some fire at 12,000 and some at 16,000 revolutions, so we have got to spin that and calibrate it and see that it is running right within a small part of its thirty second life, because in thirty seconds those weights go out and it is done for.

Now I want to show you the development. We spin that fuse cap in a holder at 16,000 R.P.M.'s and that is the same as the rifle escapement, about two hundred and eighty times a second, I think. In the end of that is a little hole and that changes positions. You can see it going by so that it will vary the life when we change it. That is reflected from one end so we put this other thing on and in about two seconds it is up to speed and then we have an optical system of a lamp that comes down and focuses on a big spot. A little pendulum is going around and if it isn't moving at all it will be reflected at the same time, but if it is moving back and forth past that hole it will be reflected up to the optical system to a photo-electric cell and mirror and that gives us the speed of that little clock motion.

Now we want to know if it is fast or slow and we put on one set of plates of a cathode ray tube and on the other set we put an accurately timed constant frequency wave and that means that if the escapement is slow this sinewave that appears on the screen will be traveling to the left, and if it is fast that will be traveling to the right of the screen, so you can throw it on and take a reading. Then you can stop it and there is a little adjustment, and adjusting screws that can be fixed and then

you can try it again and in about two shots you have got this properly calibrated to do the trick. That was quite a calibration trick. In the first place to spin it at 16,000 and have it absolutely true and quiet. I thought you might be interested in that.

Now there are a couple of subjects that are somewhat out of your line but I was asked to mention them and I would like to cover them very briefly.

I was asked to say something about the atom smashing which some of you have probably read about or have seen our Silver Top Beer sign out at East Pittsburgh. We now come to a subject that is far beyond the ordinary human experience. All of our everyday electrical, mechanical, and physical phenomena in the field of engineers are based on the mechanical sciences and based on the ninety materials which we call the chemical elements. Practically always we can meet our everyday needs by transforming elements, compounded from one to the other of these elements by chemistry. It means the combination of myriads of compounds by reactions which produce different combinations and we learn how to do what nature does, how to change things and create new products by chemical changes involving all of the elements.

In each the so-called elements remain unchanged and must be considered the ultimate raw material of the chemist.

With the coming of relativity and quanto-mechanics, the theories go forward in new ways to find the matter and energy and the physicists are trying to find the complexities that exist.

In the last decade that has greatly changed our ideas which were held by most of us when we went to school. Instead of having ninety-two elements that are supposed to be indivisible we now know that the elements themselves and all matters are built up and have a few fundamental elements.

The first one is the electron. You probably have been working with electrons. It is the smallest particle, is very light and has a unit negative charge.

The next is the proton. The proton is about 1840 times as heavy as an electron and it is the nucleus of the hydrogen atom. This has a positive charge of one unit, so that as a hydrogen atom it must hold one electron in its orbit.

The next is the neutron and it has a mass about the same as the proton. It was recently discovered and has no charge. That is the reason it has the same mass as the proton.

The positron is like the electron, but has the positive instead of the negative charge. It is low mass.

Now it is wise to get an idea of what the atom looks like. Afton found this out in 1912 from the alpha particles out of the radium. The alpha particles are the scattering of the helium. It was proved that the atom consists of a very small central nucleus around which there are some negative charges and that nucleus is positive charged around which the charged particles are held there by attraction just like our moon is held in an orbit around the earth by gravitational forces.

Now later on Bohr found out just how those existed. He found neutrons rotating in a definite orbit, in certain rings.

Now the nucleus is the great point of attraction today. The nucleus instead of being a unique thing for each element is built up of these four entities which I have mentioned. Really only two of them are known definitely to be there and that is the proton and the electron. Now this nucleus is built up by—let's look at the picture first, by starting with hydrogen.

Hydrogen is the simplest one of the nuclei. It has one proton, one positive charge, and it will hold one electron rotating in an orbit. Heavy hydrogen, what we call detyrium, has one proton and so it will hold one electron. It has all the chemical properties of hydrogen but weighs twice as much. Then we come to the next one, two protons and two neutrons and since there are two protons and two charges, helium has two hydrogen charges, Next is lithium. There are two kinds and the nucleus is different. They have the same charge chemically. Then we go all the way up the elements, up to uranium and all the nuclei are combinations of protons and neutrons.

Now why do they stick together? All of us know that when two charged particles having the same charge, as you bring them together they repel each other with a force inversely the square of the distance, so that as you bring a positive proton together with another proton the reluctance would be so enormous they would fly apart—but they don't fly apart. They are all the same in the nucleus and of the same charge, and that is the great mystery. I might say that if we had a gram, a thirtieth part of an ounce of the nuclei of the heavy hydrogen in Chicago and another gram of the nuclei of the heavy hydrogen in New York, at that distance those would repel each other with a force of about three thousand tons so you see the enormous force required to bring them together or overcome these molecular forces. Now when we handle one at a time as we do we accomplish this by shooting a projectile at such speed and energy that it will not stop until it gets very close and when it gets very close it goes on if it gets within a certain distance. In other words, Kallaman's law of repulsion doesn't hold at certain distances. That is, if you get beyond a certain point you get past that law and by this method all the nuclei of the elements have been bombarded and changed so they are a different element or a radioactivisis on top as we call the unstable force that gives off energy, just like radium.

Now all these things are studied to learn how the matter is put together and how the forces work. I think you would be surprised to know that all the matter in Pittsburgh, and you can go down a mile or two, and take that earth if you want, all those little particles of electrons and neutrons, if we should get away from these electrical forces that control them, they could all be packed in a thimble. All of you, the City of Pittsburgh, a thousand yards below the ground, all could go in that thimble. There is so much space in matter, actually if you took a tungsten target such as we bombard in this work you can assume a microscopic view of that tungsten and it is about as dense as the solar system. In other words, the size of the nuclei and the distance away as the size of the electrons correspond to the planets, so you can imagine that there are a lot of spaces in between the molecules of matter and in the necessary nuclear studies they shoot these particles in and there is a pretty good chance they won't hit, about one in a million of them hitting a nucleus or coming close enough to cause any reaction.

Now you might say, "What do you care if you split a few atoms of one kind and make a few of another kind?" That is not the point at all, but we want to study the forces and then that will be useful in other work.

Now let me go back again and say all this relativity work is based on relativity and quanto-mechanics, all the spins of the electrons and high energy things don't follow the ordinary Newtonian mathematics that you all know in your mathematical calculations.

One more thing is that energy or any system of particles can only exist in certain energy spaces. That means that there can't be anything between a certain energy and another certain energy. It means that when you start up a motor or machine you are not having a smooth increase in speed. It is starting up by little jumps, but so close together that we can forget about the quanto-mechanics and for all practical purposes it is starting up at a regular rate. Every time there is a change in energy there must be one particle of energy and a portion or a gamma-ray goes out.

I won't get too far in this but I would like to point out why these are important. You learned in school that conservation of energy was infallible. You couldn't create or destroy energy. You could render it latent, change it to another form. You also learned that a concentration of mass as in hydrogen and oxygen, you could burn them and the water formed would weigh as much as the two things. Now as far as all measurements in the past have gone, that is true, but it was only true because you couldn't weigh carefully enough. Now when you put in hydrogen and oxygen together and burn them and condense the water vapor to the same thing, there was a lot of heat that went off, so we have got the heat

(Continued on Page 30)

January Chapter Meetings

Chapter Meeting Announcements must be received on or before the 20th of preceding month to appear on this page. Members and friends of The Society contact Chapter Secretaries for meeting details if your announcement does not appear below.

BRIDGEPORT

January 12, 1939—Dutch Treat Dinner, 6:30 P.M.; Meeting, 8:00 P.M., Hotel Barnum.

Speaker: Mr. E. V. Crane of The E. W. Bliss Co.

Subject: Punches and Dies.

Happy New Year from Bridgeport Chapter.

CHICAGO

January 9, 1939—Dinner, 7:00 P.M.; Technical Session, 8:00 P.M. Sears Roebuck Auditorium, North Avenue at Hartford.

Speaker: Mr. R. L. Templin and Mr. J. F. Coneen of the Aluminum Company of America.

Subject: The fabrication and machining of Aluminum, illustrated with movies and slides.

Reservations: Mr. Nils H. Lou, 3815 Glenmore Avenue, Baltimore, Hamilton 0851.

CLEVELAND

Friday, January 20, 1939—Dinner, 6:00 P.M.; Technical Session, 8:00 P.M. G.T.V. (German Club), 1622 East 55th St.

Speakers: Mr. C. S. Gates, Chief Engineer, and Mr. Geo. Ulring, District Representative, of the Allen Mfg. Co., at Hartford, Connecticut.

Subject: "A Ticket to Continuous Performance," accompanied by Motion Pictures.

Reservations: Dinner a la Carte. Make reservations with H. P. Boggis, ENdicott 3611.

DAYTON

January 12, 1939—6:30 P.M. Gibbons Hotel.

Speaker: Mr. Snyder, Morse Twist Drill & Mach. Co., New Bedford, Mass.

Subject: Proper Selection and Use of Drills.

Reservations: Walter Olt, Fu 3113.

DETROIT

January 19, 1939—Dinner, 6:30 P.M. (Price $1.50 per plate); Technical Session, 8:00 P.M. Guests welcome. Intercollegiate Alumni Club, 13th Floor, Penobscot Bldg.

Speaker: Mr. Hans Ernst, Research Director, Cincinnati Milling Machine Co.

Subject: "Physics of Metal Cutting."

Reservations MUST BE MADE before noon, January 19, 1939. Call A.S.T.E. Office, Tyler 5-0145.

HARTFORD

Monday, February 6, 1939—Dinner, 6:30 P.M., City Club; Technical Session, 8:00 P.M., Hartford Gas Company Auditorium.

Speaker: John E. Gillon, General Electric Company, River Works.

Subject: "Job Analysis," with Motion Pictures. A thoroughly practical, workable account of motion study by a man who knows his subject from all angles.

MILWAUKEE

January 12, 1939—Dinner, 6:30 P.M.; Meeting, 7:30 P.M. Republican Hotel.

Speaker: Elliott W. Stewart, William D. Gibson Co., Div. of the Associated Spring Corp., Chicago, Ill.

Subject: "General Information on Spring Design."

Make Reservations for "Mid-Winter" Stag.

NEW YORK - NEW JERSEY

January 10, 1939—Dinner, 6:30 P.M.; Meeting, 8:00 P.M. Hotel Robert Treat, Newark, N.J.

Speakers: H. L. Templin and J. F. Coneen, Aluminum Co. of America.

Subject: Machining Aluminum.

Reservations: Ben Brosheer, Medallion 3-0700.

PHILADELPHIA

January 12, 1939—Dinner, 6:15 P.M.; Entertainment, 7:15 P.M.; Technical Session, 8:00 P.M. Adelphia Hotel.

Speaker: Mr. S. O. Bjornberg, Consulting Engineer of the Illinois Tool Works.

Subject: "Gears and Gear Hobbing."

Dinner reservations must be in the hands of P. W. Frankfurter, Sr., not later than 5 P.M., January 11th.

PITTSBURGH

January 13, 1939—6:30 P.M. McCann's, Diamond and Ferry Sts.

Speaker: From Chrysler Corp.

Subject: Super Finish.

Reservations: Call Miss Wingard, Brandywine 1500, Ext. 9264.

RACINE

January 16, 1939—Dinner, 6:30 P.M.; Technical Session, 7:30 P.M. Hotel Racine Main Dining Room.

Speaker: Geo. M. Mencke, Sales Manager, Vascoloy-Ramet Corp.

Subject: "Machinability of Metals."

ROCHESTER

Tuesday, January 3, 1939—Dinner, 6:30 P.M., Todd Union; Meeting, 7:45 P.M., Lower Strong Auditorium, University of Rochester, River Campus.

Speaker: A. W. F. Green, Metallurgist, Allegheny-Ludlum Steel Co.

Subject: Molybdenum in High Speed Steel.

Reservations are necessary for dinner only. Cards will be sent to all members.

SCHENECTADY

January 5th, 1939—Meeting, 8:00 P.M.; Rice Hall General Electric Co.

Speaker: A. W. F. Green, Metallurgist Ludlum Steel Co.

Subject: Molybdenum of High Speed Steels.

ST. LOUIS

January 12, 1939—Dinner, 6:30 P.M. Marquette Hotel.

Speaker: Mr. C. V. Johnson.

Subject: "Gages—Their Development and Use," with Slides and a complete display of Mechanical and Electrical Gages.

Reservations: C. J. Steinman, Newstead 0800. Guests invited.

SYRACUSE

January 4th, 1939—Meeting.

Speaker: A. W. F. Green, Metallurgist with Ludlum Steel Co.

Subject: Molybdenum in High Speed Steels, illustrated with motion pictures. Also a picture on hunting and fishing in Alaska.

TOLEDO

January 31st, 1939—Meeting, Toledo Yacht Club.

Speaker: Walter Anderson, Pres. and Gen. Mgr. of Taylor Winfield Corp., Warren, Ohio.

Subject: Resistance Welding and Machine Fabrication.

Dinner tickets $1.00 may be obtained from Sec. L. E. Rennell, 206 Crawford Ave., Toledo, Ohio.

TRI-CITY

(Moline—Rock Island—Davenport)

January 11, 1939—Rock Island Arsenal Auditorium.

Speaker: Ove Olsen, of the Sundstrand Machine Tool Co., Pump Division.

Subject: "Hydraulics."

TWIN CITIES

(Minn.—St. Paul)

January 18th, 1939—Meeting, Minnesota Union.

Speaker from E. W. Bliss Co.

Subject: Deep Drawing of Metals, Dies and Presses.

YORK

(Central Pennsylvania)

January 10, 1939—Supper, 6:30 P.M. (Price $.75); Business Meeting, 7:15 P.M.; Intermission, 7:45 P.M.; Technical Session, 8:00 P.M. West York Inn, York, Pa., West Market and Highland Ave.

Speaker: S. C. Spaulding, Metallurgical Engineer, American Brass Company, Waterbury, Conn.

Subject: "Selection of Steels for Design and Heat Treatment of Tools."

MACHINE & TOOL *Progress* EXHIBITION

A.S.T.E. Officials Report Unparalleled Space Reservations, Plan for Huge Attendance

TWO months to 1939 annual convention time. Just two months before the doors open for the Machine and Tool Progress Exhibition. And what a show it will be! If the 1938 success was a mark to shoot at, 1939's big show will place that mark three times as high.

Last year at this time, the show was just getting under way. Up to this time only a handfull of exhibitors had seen the opportunity offered them for new contacts, better contacts, and more business.

Right now, if the show committee wanted to close its books, the show would be just twice the size it was last year. And most of that space has been grabbed off by industry without any real promotional effort on the show. As a matter of fact it is but a couple of weeks since reservation blanks were sent out to manufacturers at large. The way these are coming in, it won't be long before the show is "sold out."

The A.S.T.E.'s big 1939 week, just in case you don't know it, starts Monday, March 13th. On this day is scheduled a giant preview meeting and dinner for the nation's leading industrialists, educators, ministers, legislators. To them will be accorded the first opportunity of seeing what the development of machines, tools, and processes is doing to reduce production costs, in creating new jobs and new opportunities, and raising the standard of living.

Tuesday the doors to the show will be thrown open to industry. Tuesday will also see the opening of the 1939 convention, climaxed with a technical session in Convention Hall Annex in the evening. Thursday evening the second technical session. Friday evening the big annual dinner.

The highly successful plan of confining technical sessions to evening meetings — leaving members free to visit Detroit's plants and "do" the show —will be followed again.

A departure has been made this year however in the matter of handling show invitations. To avoid the overcrowding of last year, and give exhibitors and really interested visitors a chance to talk business at the booths, each exhibitor is being furnished this year with a limited number of handsomely engraved invitations. However any exhibitor needing more invitations will be enabled to purchase these at a nominal sum.

In addition each chapter will be furnished with 100 engraved invitations beyond those going to members. In this manner, it is believed, attendance at the show can be limited somewhat by eliminating the mere curiosity seekers, while the thousands of invitations still available under the plan will insure that important members of industry will be able to attend the show without charge.

Anyone not receiving an invitation will not be excluded from the show however. For these, a registration fee of 50 cents will cover attendance at technical meetings, and plant visits in addition to the show proper.

The plan, while not new, has one exceptional feature—a certain number of invitations will be available to exhibitors, without charge.

Key to many of the exhibits at the show this year will apparently be a tie-in with the Society's fact-finding program on the relationship of machines to employment and standard of living. That is also the key to the preview meeting of Monday evening of A.S.T.E. week. The work of the fact-finding committee under Professor John Younger of Ohio State University is already under way. The preview program calls for a preliminary report from the committee.

While at the moment the committee is engaged chiefly in studies of ways and means of analyzing the social effect of the machine, it nevertheless is already busy gathering a fund of data for subsequent analysis. As a result, the report of the committee, although not complete at the time, will contain information of vital interest to the nation as a whole.

The program which the Society has set for itself—to determine the real facts —has been received everywhere with acclaim. Commendations have come from industrialists, editors, educators, etc. The Society has been invited to develop a tie-up between this program and the high-school curricula of the country. Important associations and technical groups have offered their cooperation. Publications have been hailing it as the biggest task of greatest national significance any technical society has ever set for itself.

Between this fact-finding program and the Machine and Tool Progress Exhibition, the A.S.T.E. certainly will be in the national lime-light during 1939. Make your plans now to take part in the big climax the third week in March.

John M. Younger, Chairman of the fact-finding committee, Professor of Industrial Engineering, Ohio State, honorary member A.S.T.E.

Frank A. Shuler, Chairman of the 1939 Show Committee, Past President of the A.S.T.E., Master Mechanic, Chrysler Highland Park Plant.

Homer C. Bayliss, Motch and Merryweather Machinery Co., Chairman, Program Committee, 1939 Convention A.S.T.E.

Production Perspectives

News of Mass Manufacturing from Everywhere

Indications are that **purchases** of **new machinery and production equipment** during 1939 **will be well ahead of 1938 as** the **result of improved general business conditions, according to Ford R. Lamb,** executive secretary of the American Society of Tool Engineers.

"Most mass production industries, such as the automotive, normally place their orders for new machinery and equipment in the spring and early summer months," Mr. Lamb said. "Last year indications were that some $65,000,000 would be spent for new equipment. Some of these purchase programs were subsequently suspended in view of business conditions and some of these may form a part of 1939 buying programs in addition to purchases for modernization of plants.

"With the **upswing in business** current at the present time and **every indication that improvement will be continued through the next year,** there is an added necessity on the part of machine tool and production equipment manufacturers to present their latest developments to potential buyers **in the mass production industries.** Evidence of the recognition of this necessity is the large demand for exhibit space in the second annual Machine and Tool Progress Exhibition, scheduled for Convention Hall in March of this year under the sponsorship of the American Society of Tool Engineers. It is already some weeks now since exhibit **space reserved passed the total exhibit space of the 1938 show with every likelihood that in spite of tripling of floor space available over last year, there may be insufficient accommodations to take care of all manufacturers desiring to exhibit."**

Carboloy Company, Inc., Detroit **announces the appointment of Mr. V. H. Dearle** as **Assistant Detroit District Manager.** Mr. Dearle has been with the company since its formation in 1928. He is a charter member of the American Society of Tool Engineers and has been connected with the tool industry in Detroit for over 30 years.

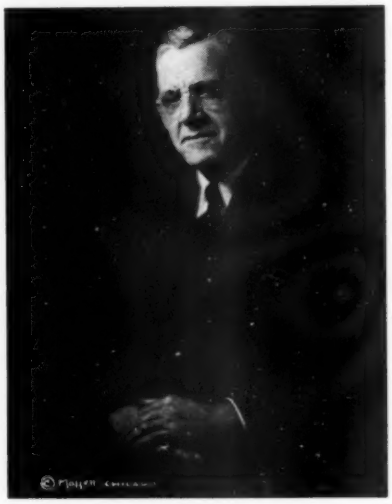
Harry M. Lewis, Detroit A.S.T.E.er **died** Wednesday, **December 28, 1938.** He was fifty years old. He had been **President** and Sales Manager of **National Tool Salvage Company** since 1926. Funeral services were held at Royal Oak, Michigan, Dec. 30th.

Mr. Lewis was well known among tool men in the Detroit section as well as in many other industrial sections.

Guy Swartz, Detroit A.S.T.E.er, has **announced the appointment of Mr. E. J. Wismer** as factory superintendent, **P. F. Dubois,** chief engineer and **Ben Boutell** as office manager **for** the **Swartz Tool Products Company.**

A **$350,000** steel and brick **addition,** to the plant **of** the **Addressograph-**Multigraph Co. on Babbit Road, **Euclid,** Ohio, Cleveland suburb, will be **started** in **January,** weather permitting.

The **production outlook** in the automobile industry is, generally, **better**



R. C. Danly, President of the Danly Machine Specialties, Inc., died December 15 at Hinsdale, Illinois, at the age of 66. For 46 years he had been active in manufacturing, founding his own business in 1923. Surviving him are 5 sons—Philo H., Geo. I. and Robert E.—active in the management of the company.

than it was **a year ago** at this time. **Chevrolet** dealers sold 76,938 new cars and trucks at retail during the month of November, **W. E. Holler,** general sales manager announced. This is **an increase of 4,455** units over sales for the same month in 1937. The last ten days of the month, Chevrolet's **figures** indicate, **looked particularly good in comparison with the corresponding period last year. Shipments of Hudson cars** in the United States for the week of Dec. 3 were **5 per cent higher than for the same period a year ago.** Retail sales for the week were greater than for any previous week in the last twelve months and 10 per cent above the same week last year. **In line with improving business conditions Pontiac** Motors **completed November with 14,761 retail deliveries of new cars.** This figure compares with 8,344 for October which was the month of the 1939 model introduction and with 12,830 for November, 1937.

K. T. Keller, president of Chrysler Corp., has **announced** that **W. J. O'Neil, vice president of the Dodge Bros. Corp.,** has been **named president** and general manager of Dodge. Keller has held the office of president since acquisition of Dodge by Chrysler Corp. O'Neil has been active in the management of the Dodge division since Chrysler Corp. bought the Dodge properties in 1928. He first became associated with the automobile industry in 1907 as night superintendent of the Milwaukee Motor Co. During the next few years he served as day superintendent of the Petrel Motor Car Co., Beaver Manufacturing Co. and Michigan Buggy Co., and in 1911 went to work for the Packard Motor Co. in charge of the time study department.

The Falk Corporation, Milwaukee, has **lost through death its Vice-President** and Chief Engineer, **Percy C. Day,** 63 years old. Prior to coming to the United States in 1910 he was in charge of the West Drayton Gear Works of the Power Plant Company in England. It is reported that he designed, built, and operated the first plant producing calcium carbide in the British Isles and that **he has been an authority on the design of helical gears.**

Fairbanks Morse & Co., has sold its refrigerator division to the Philco Radio and Television Corporation, Philadelphia. The refrigerators were made in F-M's Indianapolis plant. Philco will continue to make the refrigerators at Indianapolis.

A one-story **addition** is scheduled **to start** shortly **to the plant of** the **H. M. Harper Company,** 2620 Fletcher Street, Chicago. This company is engaged in making nuts and bolts. The present building will be modernized at the same time.

Frank G. Hogland, 74 years old, President and **founder of the National Lock Company,** Rockford's largest industry, **died December 14** following a short illness. Mr. Hogland was prominent in Rockford industrial and civic affairs for many years. He was born in Sweden in 1864 and came to this country in 1870 with his parents.

The **Steger Piano** Manufacturing Company, Steger, Illinois, **has been purchased by the Steger Furniture Manufacturing Company.** The plant is located at 34th Street and the Chicago & Eastern Illinois Railway.

We announce, with deep regret, the **passing of Mr. Carl Pioch,** perhaps one of the best known Tool Engineers in the mid-west. Mr. Pioch had many friends among Tool Engineers and was himself recognized as an engineer of outstanding ability. Formerly connected with Maxwell, Chrysler, Lincoln and other automotive concerns, Mr. Pioch was in later years interested in the Pressed Metals Engineering Service. Scion of an old German family, the deceased is survived by his parents and two brothers, William and Ernest, the former Chief Tool Designer at Ford Motor Company, and by his wife, Violet, and daughter Marcella. Mr. Pioch was 45 at time of death, one of our younger old timers.

Veterans of Pratt & Whitney, Hartford, were honored, recently, by being awarded service pins indicating the

number of years of their service in the company. Those having ten years or more of service were awarded the heavy gold pins, while pins studded with diamonds were awarded to those having 20, 30, 40, 50 or more years of service. The four oldest employees with a total service record of 235 years were: Wilbur M. Gladding, 57 years, John F. Galvin, Sr., 53 years, Henry C. Stevenson, 53 years and Flavel W. Woodworth, 71 years.

An increase of 6.8 per cent in general business activity in New England is recorded by the New England Council's index of general business activity, which is 86.8 per cent of the estimated normal. **For the first time in 1938, the monthly rate of New England business was equal to the rate prevailing in the corresponding month a year ago.** The increase was attributed to the speedy restoration of public service and transportation facilities following their interruption by the hurricane and fall floods. The following percentage changes were noted: Electric power production, up 1 per cent; merchandise and miscellaneous car loadings, off 11 per cent; industrial employment in Massachusetts, exclusive of shoe and textile employment, off 15 per cent; metal tonnage receipts off 7 per cent.

Manufacturing payrolls for Rhode Island in November were .4 per cent higher than in October, according to figures released by the Brown Bureau of Business Research, Providence and 1.2 per cent higher than a year ago.

About **500 employes of L. S. Starrett Co.,** Athol, have been **granted an eight hour a week increase in working hours,** making the schedule a 40-hour week. The company has been running on a 28-hour a week schedule until about a month ago, when a 32-hour a week schedule was put into effect.

Increases in both the number of employes and the amount of payrolls in Worcester are reported by the State Department of Labor and Industries. **An increase was also reported for the entire state, but Fitchburg showed a decline.**

Evidence of the further expansion of the Shawinigan Resins Corp., a subsidiary of the Fiberloid division of the Monsanto Chemical Company, Springfield, is shown by an application for a new building. The new structure will be added to the company's plant adjacent to the Fiberloid plant in Indian Orchard.

For the **expansion and modernization** of the company's heat treating department, the **Worcester Wire Works,** a branch of the National Standard Co., is **building an addition** to its plant at 70 James Street, Worcester. **According to George M. Blackwell, plant manager,** the **addition will permit an increase in the company's production capacity** and will house newer equipment for treating metals. The company manufactures high carbon speciality wire. Business at the plant has been on the uptrend since last August, Mr. Blackwell said.

With an entirely new management, **Harrington & Richardson Arms Co. at Worcester, is planning to increase operations.** The company filed a petition in Federal District Court last month to reorganize under the Bankruptcy Act. Clarence C. Dodge, treasurer and general manager of George F. Blake, Inc., has been elected president and Olin L. Stanhope, treasurer. Theron L. Loose has been brought from Springfield as general manager.

Norton Co., Worcester, **announced its traditional distribution of Christmas turkeys to every employe of the company throughout the world.** The company's Christmas party was held Dec. 23 when thousands of employes paraded before the distributing committee and were handed a bird for the Christmas table. **Marcus W. White, purchasing agent ordered more than a carload of the highest quality turkeys for** distribution to **all employes.**

Announcement has been made at the Doyle Works of the E. I. duPont Co. Leominster of the **transfer of Edgar E. Bullard, works manager** here for the past nine years **to** the position of director of manufacture at the **Arlington, N.J.** works of the company. **Herbert E. Dorr,** until recently **an assistant to Mr. Bullard, will become manager of the Leominster** plant.

The **Anderson-Morison Machinery** Co. at 581 Boylston Street, **Boston,** has **been organized** by George H. Morison and Herbert Anderson.

Twenty-one new industries, brought to **New Bedford** during the past ten years, **have paid $20,143,339 in wages to 8,000 employes** according to the New Bedford Industrial Development Commission. To attract the new plants less than $84,000 or four-tenths of one per cent of the returns was spent.

Herbert H. Tarbell, personnel and **safety director of Wickwire Spencer Steel Co.,** Worcester reports that the concern's "good housekeeping plan"—"Cleanliness, orderliness and safety"—had in 35 months contributed to a reduction of 68 per cent in accident frequency as compared with the years 1929-1935 inclusive.

Directors of the **Perkins Machine & Gear Company,** West Springfield, have voted a quarterly dividend of $1.75 on $100-par preferred stock. With the exception of the passed dividend last quarter, the company has met this usual dividend regularly since June 1, 1935. The concern, which entered the airplane field last year through the manufacture of parts, principally for Pratt & Whitney Aircraft of Hartford, hopes that within the next few months there will be an increase in business that will warrant the purchase of additional equipment and enlargement of personnel.

Van Norman Machine Tool Company of Springfield has announced a common dividend of 60 cents, payable Dec. 20 to stock of record Dec. 9. The dividend is an increase of 20 cents over the dividends paid in the two previous quarters.

Development of the new engine at the Indian Motocycle Co. plant at Springfield is **proceeding slowly, Loring Hosley,** general manager says. Mr. Hosley **said the engine is for the generation of electric power** and is of the one-cylinder type of gasoline motor used in light systems.

Thirty representatives of the Van Norman Tool Company, Springfield attended a company sales convention in Chicago filling a special car on the "Eastern States" express. Agents from every branch of the company convened there. The group from Springfield was under the supervision of Leo Hunderup, assistant general manager.

Norton Company, Worcester, has completed research on a type of diamond wheel which embodies use of a metallic bond. Diamonds are actually imbedded in solid metal, the entire rim of the wheel being one homogeneous piece. This eliminated any joint between diamond impregnated, grinding surface and balance of the rim that might cause premature breaking away of expensive abrasive material. The metal used is a special allow that holds diamond particles securely yet allows enough wear to keep the wheel free-cutting.

A. T. Simonds, president of the Simonds Saw and Steel Company, Fitchburg, **said recently his company would not favor government supervision of profit-sharing.** Simonds said the company in existence 106 years, was "a paternalistic, autocratic family affair" that had maintained a pension fund for the last 35 years.

A **contract calling for** the construction of **250,000 radio receiving sets** has **been received by** the Bridgeport plant of **General Electric Co.** from the New York Edison Co. **Employment at the G-E plant reached 5,800 in late November, compared with 3,000 last March. Bridgeport Machines, Inc., has been formed** in Bridgeport by Rudolph and Elsa Bannow and Magnus and Agnes Wahlstrom, former owners of the Bridgeport Pattern & Model Works, 52 Remer street, Bridgeport, and will occupy the same address. **The company will serve several local and out-of-town factories with high-speed milling machines.**

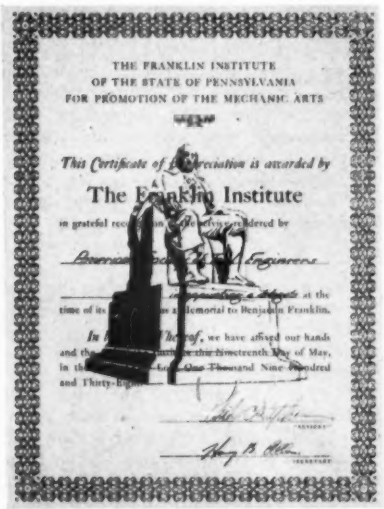
Philip B. Gale, chairman of the board of Standard Screw Co., **reports steady improvement in production** at the four plants, one in Hartford, one in Chicago and two in Elyria, Ohio, with a **total increase in employment during the past two months of about 600 to 700 hands.** Plant expansion continues on a broad scale in the Connecticut industrial field. **General Shaver,** Inc., Bridgeport, a Remington-Rand subsidiary, **has taken four floors in the former Locomobile plant,** Bridgeport, **and will consolidate all operations in 70,000 square feet of floor area there. . . . Bard-Parker Co., Danbury, has let contracts for a new building extension** on Triangle street which will provide needed space for the company's present products.

Chapter Doings

By Geo. J. (Jitter) Keller

It is pleasing to me to wind up the old year and start the New Year with so complete a column on Chapter Doings this month. There are still some missing, as you will note, but we hope sincerely that before long this column will be complete. I hope all of you out on the firing line have had a Merry Christmas and that by the time this issue reaches you that you will have gotten over the effects of a whoopee New Year so that you will be in shape to enjoy the prosperity of the coming year.

Tri-Cities (Chapter No. 23) held an organization meeting on December 2nd and received its charter at the Fort Armstrong Hotel, Rock Island, Ill. Fifty-five members were present for the dinner with more for the business meeting. Pres. Wagner opened the meeting with a talk. Ford Lamb explained the history and details of the organization, accepted 55 charter members and granted the charter. This chapter will include the entire industrial area around the cities of Moline, E. Moline, Rock Island, Ill., and Davenport, Iowa. Major portion of organization work under the direction of Otto Reller and Kenneth Jasper with the help of many more other Tool Engineers in this section. They have a good start and the prospects of many additional members are very good. The officers elected are Otto Reller, Production Mgr. Moline Tool Co., Chapter Chairman; John B. Morganthall, Ch. Tool Designer, John Deere Wagon Works, Vice-Chairman; Kenneth Jasper, Tool Designer Rock Island Arsenal, Secretary; and W. Z. Fidler, Ch. Draftsman Reynolds Eng. Co., Treasurer. Welcome to our fold, Tri-Cities. Let us hear from you often.


THE FRANKLIN INSTITUTE
OF THE STATE OF PENNSYLVANIA
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This Certificate of Appreciation is awarded by

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Certificate received by A.S.T.E. H. Cadwallader, Jr., Standard Shop Equipment Company, was A.S.T.E. Delegate to the dedication.

Regular meeting of **St. Louis** Chapter was held at North Side Y.M.C.A. Dec. 6th. The meeting was well attended and they heard an able presentation by Geo. Mancke of Vascoloy Remet Corp. on Cemented Carbide Tools. Mr. "Broadside" Burnside was the most inquisitive man there. Sinning, Sachleben, Nieman and Johanning came in after the cocktail was served. They knew it was a fruit cocktail. 100% Doogan is on the loose and has promised 100 new members by Mar. 1st. Boy, will he be hard to live with if he falls down. 300 for the next meeting—that's the goal. Go get 'em, St. Louis. You can do it.

Cosmopolitan Chapter NY and NJ had about 350 at the December meeting to hear Kirke W. Connor, Micromatic Hone Corp. deliver an able presentation on surface finish. Many slides were shown showing honing technique in the aircraft industry. Bill Dinger says they have 208 members and are now shooting for 300. Tom Orchard, fun raiser extraordinary, is putting on a big theatre supper party Feb. 17th in one of Broadway's hottest spots, the International Casino. The $5 ticket includes tips from hat girl to bell captain, City and Federal tax and a pre-dinner cocktail (75c retail). Joe Brady is captain of the N.Y. ticket selling team and Stanley Gruchacz of the N.J. gang. Prizes for the highest ticket sale in each group and a bottle of giggle water to the winning table.

Dec. 13th **Racine Chapter** turned out with 110 members and guests at the dinner held in Hotel Racine. R. E. W. Harrison, Chambersburg Engineering Co. talked on the subject "Developments in Modern Drop Forging and Their Relation to Current Machine Shop Practice." After a very interesting discussion from the floor Canadian Railways presented three movie films entitled Big Game Trails, Muskie Fishing and Jasper National Park. Genial Bouton announced two new memberships and two more applications. Mike Adams sends his regards. Gene saw him last week.

Chicago Chapter's December meeting was a knockout. One hundred and fifty members and friends enjoyed very much the color movies on the making and application of stainless steels entitled "Steels of Today and Tomorrow" presented by A. W. F. Green Allegany Ludlum Steel Corp. Sound equipment required AC current and all they had was DC so Mr. Green produced the sound. He also presented a color film Hunting and Fishing in Alaska. The boys forgot their engineering problems long enough to do some community singing accompanied by an accordian. Believe me, these Tool Engineers can sing. Harry Fruehauf talked on fact finding. J. H. Polhemius delivered the welcome address. Erling Lunde introduced the speaker C. E. Cook of the Crane Co., who extended a cordial invitation to A.S.T.E.'ers and their friends to attend open house on Jan. 9th at the Crane shops and laboratories.

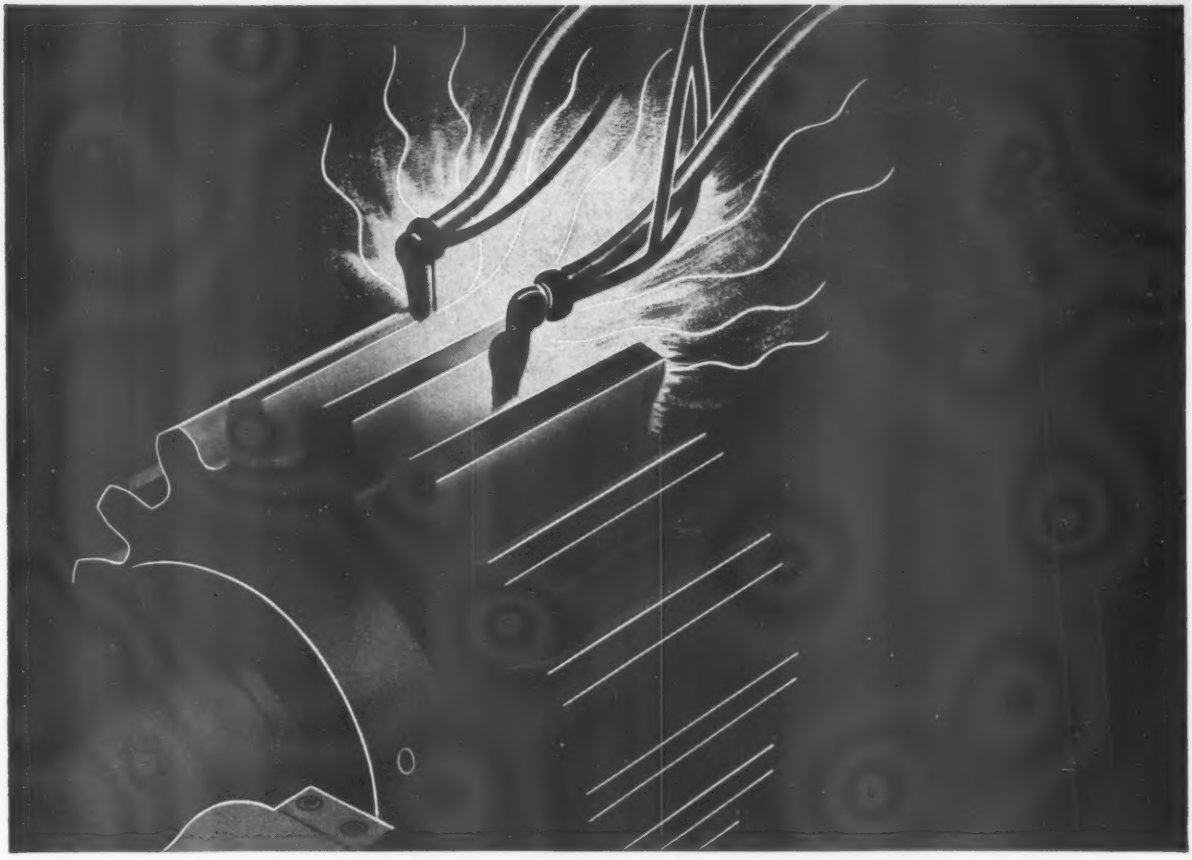
Philadelphia had another record breaking meeting on Dec. 8th. One hundred and twenty dinners were served and many came in later. A. W. F. Green, Allegany Ludlum Steel Co., presented the same broadcast that he did in Chicago on the 6th. Believe me he covers the ground. Many door prizes were awarded and much harmonizing was enjoyed during the intermissions, together with several acts of vaudeville. We extend our thanks to Edgcomb Steel Co. for their hearty co-operation in making this a successful meeting.

Milwaukee's December meeting was well attended. Vice Chairman Haywood introduced Arthur W. Peck, Milwaukee Die Casting, who spoke on Die Casting and traced the history of this art from the beginning to the present date. Sorry that Mark Hennessy was called out of town. Will look for his talk at a later date. Hurray, Milwaukee is operating on the right side of the ledger according to the report of Treasurer Sid Hall. The Brewers are planning the annual mid-winter stag to be held at the Club Madrid some time in January. Emmor says get your reservations in early.

On December 7th, **Syracuse** chapter consisting of 167 members and guests listened to Hans Ernst, Cincinnati Milling Machine Co., on Physics of Metal Cutting, illustrated with slides and moving pictures taken through a microscope. The meeting was very interesting and a great deal was gained by everyone. Charlie Wallace of Rochester, N.Y. and Tim Buell of Rockford, Ill., attended. On December 9th they had their first annual dinner dance. Fifty-seven couples indulged in dining, drinking, dancing and bingo. The party was arranged by Adams, Owens, Whatley and Co. Harold Emerick and the Missus carried off one door prize and Martin Ness and the Missus took the other. Ray Adams seemed to be the most popular member present. He indulged in everything but Bingo and even gave an exhibition of the big apple and the Lambeth Walk. No, Bill, it isn't personality or figure that puts Ray over with the ladies—it's salesmanship. Your editor really knows.

Twin Cities Chapter, **Minneapolis** and **St. Paul**, held their meeting on December 14th. Their first speaker was Dayton Rogers, of Dayton Rogers Company, who outlined the advantages to be gained by the use of tempory dies for the first production runs on new models. E. O. Wistrand of the Minneapolis Honeywell Regulator Co. spoke on the folly of building permanent punch press tools and allowing them to be operated by inexperienced men. The last speaker, A. J. Scheid, Jr., Chief Metallurgist for the Columbia

(Continued on Page 22)



ECONOMY — WITH A MORAL

FLAME HARDENING of steel where exceptional wear resistant properties are required is a comparatively new process, but the economies resulting from its application in conjunction with Molybdenum steels, are most significant. They are graphic proof of the cash value of constantly re-studying your production processes and material specifications in the light of improved methods.

When high wear resistance plus good physical properties are required, flame hardening makes the use of relatively inexpensive alloy steels possible. Molybdenum steels, particularly SAE 4140, 4150 and high Carbon (0.40-0.50% C) Manganese Molybdenum, are exceptionally suited for flame hardening. They are practically fool-proof. Molybdenum (next to Carbon) is the most effective hardening agent normally added to steel.

Molybdenum steels and irons make production dollars go farther in many ways. Our technical books, "Molybdenum in Steel" and "Molybdenum in Cast Iron," will be gladly sent free to any interested production executive or engineer.

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Climax Molybdenum Company
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MOLY

(Continued from Page 20)

Steel Co. described the various kinds of tool steel in use today and explained by means of lantern slides the correct as well as the incorrect way to heat treat them.

106 sat down to dinner at the **Rochester** meeting on December 8th. During the coffee period Eastman Kodak Co. presented colored pictures of the Cornell-Dartmouth Football game. After dinner they migrated to Strong Auditorium for the talk of the evening. 400 listened to Hans Ernst broadcast on the subject of Physics of Metal Cutting which he had presented the night before in a neighboring chapter. Saw John Dense at the Buffalo meeting of SAE last month. Mr. Newton, the name is Keller—not Kelly.

A Christmas Party on Friday evening December 2nd for **Dayton Chapter** members, wives and sweethearts was a bang-up success. Dance music was furnished by the A.S.T.E. entertainers "Paderewski" Johnson, "Hot Lips" Pitts and "Banjo Eyes" Shetterly. Can those boys go to town. On December 12th, they had their regular meeting. The man behind the Chairman, Vice-Chairman George Goodwin of the Master Electric Co. extended the facilities of the plant and served a turkey dinner with all the trimmings from soup to nuts. L. L. Warner, Vice President Master Electric Co. spoke of the responsibilities of Tool Engineers. After a plant tour, Thomas Barrish, Marlin Rockwell Corp., Jamestown, N. Y., gave an illustrated talk on ball bearings and their applications. You've been holding out on me, Tom, didn't even know you were a talker.

Bridgeport Chapter had a dinner meeting December 8th at Mary Journey's Inn with nearly as many guests as members attending. Tool Engineering efficiency was applied to the consuming of the dinner. K. C. Monroe, LaPointe Machine Tool Co., talked on the development of broaching and was assisted by K. M. Macomber, who led the lengthy discussion. Charley Speakman will probably be heard on Major Bowes program soon. He won a toy one man band as a door prize. Eddie Nevens, the singer man (not troubador), seldom misses a meeting.

Buffalo Chapter held its December meeting at the Touraine Hotel, and about 60 members and guests attended and were we surprised when in walked that genial, peppery personality, full of vim, vigor and plenty of push for A.S.T.E., Ford Lamb. We sure were glad to see him. He gave us a very fine talk on our next annual meeting and exhibition to be held in March. This man Lamb is always boosting. Come again, Ford, we always feel better after shaking your hand. E. B. MacDonald gave a pep talk on obtaining members. Always thought a Scotchman was a man of verra few words. Allan Mfg. Company presented a picture entitled "A Ticket to Continuous Performance," showing the manufacture of safety screws and their application to machine tools.

Thursday, December 8th, was a slam bang meeting for **Detroit Chapter** at the Intercollegiate Club. 400 members and guests filled the place to a bursting point. In fact, some of the lucky devils including Pres. Wagner were forced (?) to eat (?) in the adjoining barroom. Purser Demorest and Scribe Smith almost missed out altogether. They were detained by a big-eyed entertainer whom they were entertaining. It has been suggested that they bring their own duck to the next turkey dinner. Pres. Wagner was on the loose about the coming Machine & Tool Exposition. No fooling, Walter is a swell guy and when it comes to boosting A.S.T.E. doings he never runs out of chatter. It is rumored he had to make a good showing because his big boss, H. J. Robinson, Gen. Supt. of Lincoln Motor Co., was present. A nominating committee was elected and it was found necessary to elect only two members. The combined weight of Bill Smila and Luke Beech is enough for 3 men any day. Detroit Community Fund had the floor for 15 minutes in which to show a movie. D. A. Wallace, Pres. Chrysler Div. Chrysler Corp., broadcast on Super Finish which was the high light of the evening. The lecture was supplemented by charts and a small super finishing machine. The name of Dave Wallace brings back to your editor's memory a call he made on him years ago in Waterloo, Iowa. He's one of the big shots of the motor industry and a grand fellow.

Hartford had its largest dinner and technical session on December 5th. There were 177 at dinner at the City Club. Clayton R. Burt, Pres. of Niles Bement Pond Co., gave an interesting account of his recent trip to Russia. Hans Ernst, Cincinnati Milling Machine Co., addressed 350 at the technical session at the Gas Co. auditorium on metal cutting. Hartford chapter is established as one of the best and most influential technical groups in New England. There were 26 men at this gathering from Springfield, others from Greenfield, Worcester, Waterbury, New London, New Haven and New Britain were present. Good work, Hartford.

Toledo's November meeting was held at the Toledo Yacht Club. Speaker Ralph Powers of Electronic Control Corp., Detroit, with the aid of sample devices and a blackboard, explained the conception, development, construction and application of electronic control devices and their future. They had 22 visitors, several connected with the glass industry of Toledo, whom they hope to have soon as members. One of Toledo's A.S.T.E.'ers, William Pfeil, has been appointed president of the American Broach Sales Company of Detroit.

Rockford came through with another grand session on November 10th. The idea of exhibits in the lounge seems quite popular and a sociable hour is spent there before dinner. At the speakers' table were Carl Halborg, Gen. Mgr., Colonial Broach Co., Detroit; William Hart, Ch. Engineer, Colonial Broach Co.; Frank Ruhl, Co-Chairman of Rockford Chapter, and several guests from Tri-Cities chapter, among whom were Mr. Gilchrist, Kewanee, Illinois; Mr. Joiner, of Davenport, Iowa; and Otto Reller, of Moline. During the dinner the electric organ furnished by Walter Julian and played by Carolyn Dahlin was 'abso-

(Continued on page 44)

D. A. Wallace, President of Chrysler Division, Chrysler Corporation, was the speaker on "Superfinish" at Detroit's January meeting—shown above.

STARRETT INDICATORS
for Every Requirement

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Standardize on

STARRETT TOOLS

BUY THROUGH YOUR DISTRIBUTOR

Handy Andy's . . WORKSHOP . .

While we confine ourselves to peaceful pursuits, various aspirants to the cloaks of bygone great (?) seem hell-bent on seeing how far they can play the game of bluff without being called —and the way it looks it won't be long now. But when it comes to the showdown let us hope that the players with the weak hands will lose gracefully; even now, the whole thing can be laughed off and nobody hurt. But whichever way it goes, let us keep our balance; after all, we are units of a society that comprises several creeds and various racial groups, nor have we been conscious of any differences because of that. What is to happen will happen, not because men in our walk of life want it to happen (we are committed to construction, not destruction) but because forces beyond our immediate control dictate the destinies of nations. So, between ourselves, may the Spirit of Peace prevail; for us Tool Engineers, good fellowship and understanding. And who knows?—friendships among men may yet reconcile differences between nations.

"Who writes that darned 'Handy Andy,' who said 'recreation in a lighter vein'?" a reader wants to know. "If he could have seen me hunting ducks with some(one) of my 87 guns, with rubber boots full of water when I went after the duck and got WET, he would have thought that it was heavier vein. Recreation h—l—until next year.

Bill."

Dear Bill: Thanks for yours and many happy returns. Now, were your boots full of water before or after retrieving the duck?—you're not very explicit. But why not wear a diving suit?—or get yourself a dog? Now, I wonder if there is anything to this mooted unequality of distribution of wealth after all?—imagine it, a guy with eighty-seven guns! Uh, Bill, you wouldn't have one with a bent barrel or reverse English in it or something like that, that I could hang over the fireplace in my rumpus room? Eh? I loaned the last gun I owned to a friend, and rather than harbor hard feelings (when I saw it after return) I made him a present of it. I'd tell you about it, only it's a sad story, one that only a gun lover would appreciate.

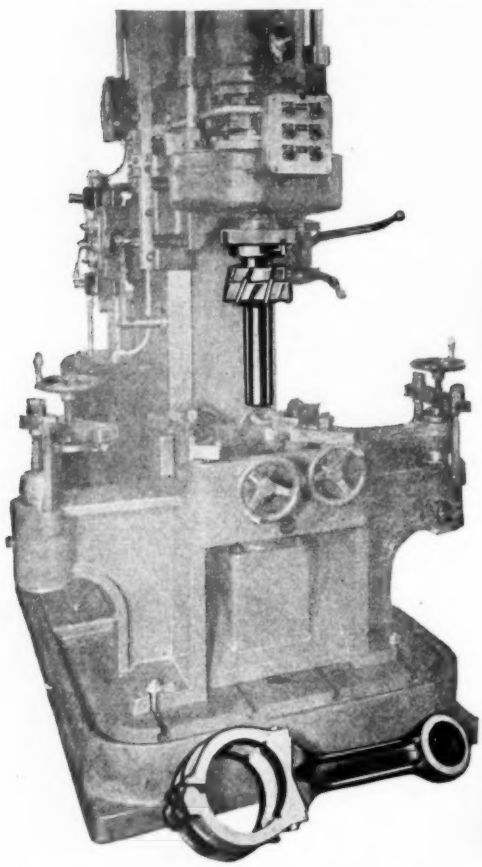
▼ ▼ ▼

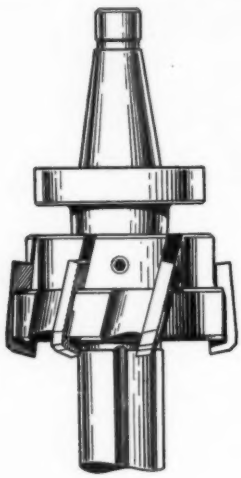
Speaking of guns brought on a flood of reminiscence, but I'll save that for another writing. Personally, I'm not in sympathy with the reformers (?) who would disarm the nation, putting the decent element at the mercy of thugs and crooks who carry guns despite law and reform. Or perhaps because of tacit protection. Of course, there is the rebuttal that an armed citizenry is conducive to accidents, and gosh knows there is plenty of promiscuous shooting, all of which is not accidental. But that is a matter of education and training, like driving a car; we hear plenty about the killers of the highways but very little about the vast majority that drives year in and year out without accidents. Start 'em right and they'll stay right.

▼ ▼ ▼

I fired my first gun when I was five, and while I never developed into a Deadeye Dick I could hold my own with the better than average until the bifocals threw the sights haywire. And I've never had an accident; that was licked out of me by Grandpop the first (and only) time I ever pointed an empty gun at a body. Growing up, most of my boyhood chums had guns—ranging from B.Bs. and Floberts to heavier rifles, carbines and shotguns, from single barrel pistols to Colt .45s. And none of 'em ever robbed a bank or ran afoul of the law—although one or two of 'em made monkeys out of aspiring bandits—nor, as far as I can recall, was any of them involved in an accident. Well, so much for guns, only, I insist that a straight talking, straight shooting citizenry is conducive to peace and respect for law. If there is to be any emasculating, let it be among the denizens of the underworld.

(Continued on Page 28)





Gair-Lock Boring Tool for boring large crankshaft ends of connecting rods. Designed by The Gairing Tool Company

SPECIALISTS IN FINE CUTTING TOOLS FOR 21 YEARS

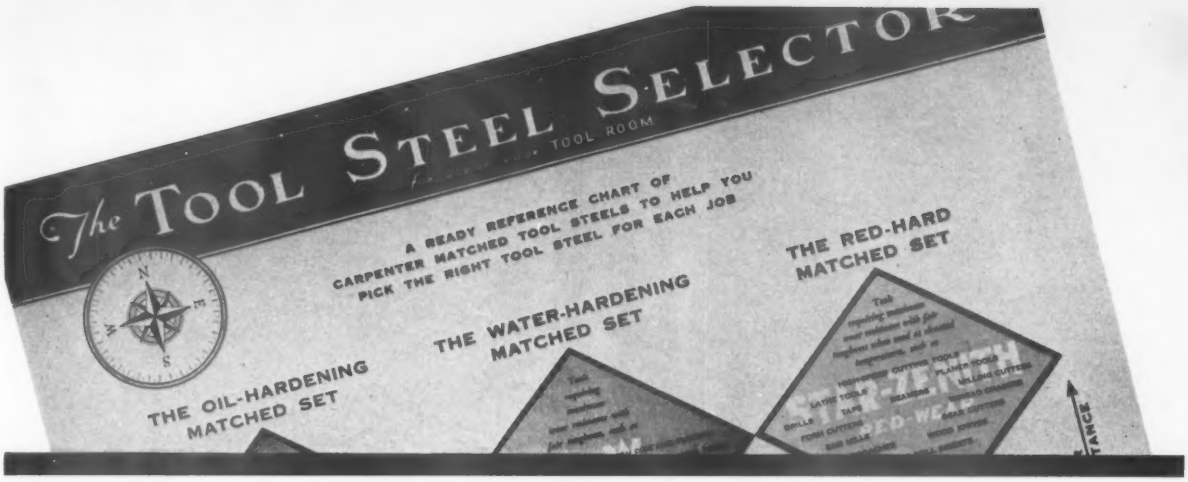
Speed Diesel Engine Production

Gair-Lock Cutting Tools are being widely adopted for roughing, semi-finishing and finishing operations on Diesel Engine connecting rods, cylinder liners, blower housings, housing end plates and pump bodies. They combine accurate performance, volume production and long life. Write for Gair-Lock Folder 104.

The Gairing Tool Co., Detroit, Mich.
In Canada - Galt, Ontario

GAIRING LOCK

—the economical all-purpose blade applicable to all types of cutting tools from single point boring bars to complicated milling cutters.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TOOL ROOM
A READY REFERENCE CHART OF CARPENTER MATCHED TOOL STEELS TO HELP YOU PICK THE RIGHT TOOL STEEL FOR EACH JOB
THE OIL-HARDENING MATCHED SET
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To help you insure this kind of performance, the Carpenter Steel Company has developed a systematic method for selecting the right tool steel for each job. In addition to saving your time, this simplified method avoids trouble in hardening—and lengthens tool life.

It costs you nothing to find out how this method works. Write for a copy of the Wall Chart Tool Steel Selector. At a glance, you will appreciate its possibilities for saving time and money in the tool room. Along with it, we will send you a copy of the Carpenter Tool Steel Manual—50 pages of valuable data that show how to get more dependable performance from your tools. Your request for these two valuable aids will not obligate you in any way.

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MAKERS OF FINE TOOL STEELS SINCE 1889

The Standard Tool Steels of Industry

Tools Represent A Small Part Of The Production Cost . . . Yet In Every Case They Determine The Productive Capacity Of The Machine . . . . . For Generations Morse Tools Have Been Known Throughout the World For Their Outstanding Production Economy.

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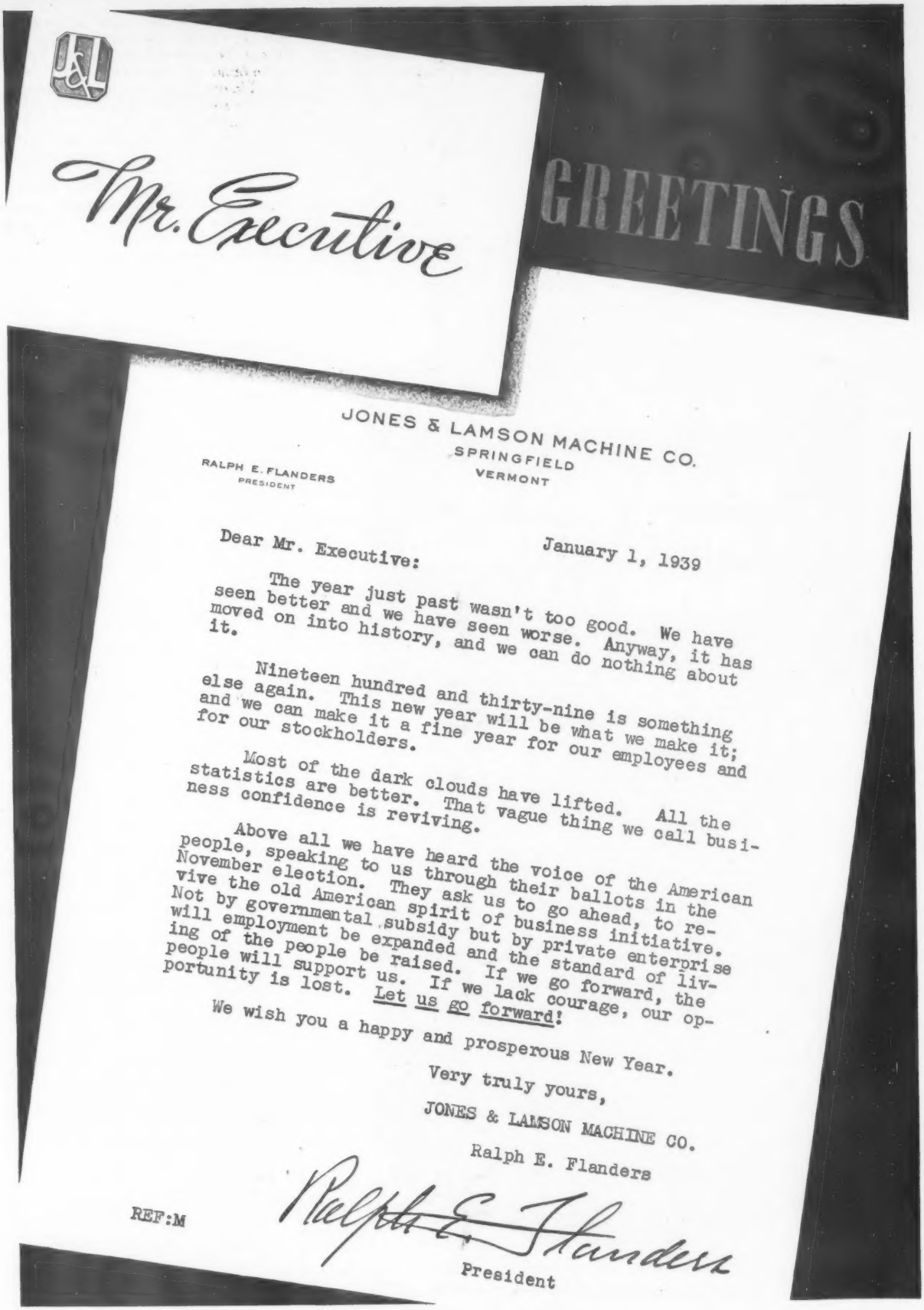


Mr. Executive

GREETINGS

JONES & LAMSON MACHINE CO.
SPRINGFIELD
VERMONT

RALPH E. FLANDERS
PRESIDENT

Dear Mr. Executive: January 1, 1939

The year just past wasn't too good. We have seen better and we have seen worse. Anyway, it has moved on into history, and we can do nothing about it.

Nineteen hundred and thirty-nine is something else again. This new year will be what we make it; and we can make it a fine year for our employees and for our stockholders.

Most of the dark clouds have lifted. All the statistics are better. That vague thing we call business confidence is reviving.

Above all we have heard the voice of the American people, speaking to us through their ballots in the November election. They ask us to go ahead, to revive the old American spirit of business initiative. Not by governmental subsidy but by private enterprise will employment be expanded and the standard of living of the people be raised. If we go forward, the people will support us. If we lack courage, our opportunity is lost. Let us go forward!

We wish you a happy and prosperous New Year.

Very truly yours,

JONES & LAMSON MACHINE CO.

Ralph E. Flanders

REF:M

Ralph E. Flanders

President

HANDY ANDY

(Continued from Page 24)

You know, I like to come back to the same theme now and then, not because I like to harp on one string, but because I like to regard essential truths from various vantage points. Take the matter of research, for instance—and who of us, privileged to peek into the research laboratory of the Westinghouse Company, were not impressed with the marvels created and the tremendous cost of creation and development? That is one thing that the smaller, independent companies cannot carry, the staggering load of financing modern research on the scale projected by the larger corporations. Yet, small as great, individual as society, is benefited by the results of research. For the research engineer is the pioneer into the realms of the unknown; because of research, we crash heretofore undreamed of frontiers.

The Standard Oil Company, once impugned by the thoughtless as the octopus of business, has doubtless done more for the benefit of mankind than a hundred smaller companies could have done, in that its scientists, in reducing waste and thereby reducing costs, have developed numerous new products. Or as the duPonts (whose war materials is but a minor fraction of manufacture) have developed or caused to be developed numerous commodities that have become essentials in the weft of our commerce. Or, as the larger automobile manufacturers—Ford, General Motors, Chrysler, etc.—constantly develop refinements that promote safety and comfort, net us better cars at lower costs. And bear in mind, that the research laboratory employs workers who in turn create employment for other workers; our social, economic and industrial schemes are so closely interwoven that one cannot tamper with the one (as incompetents sometimes do) without injury to the weft of the entire fabric.

▼ ▼ ▼

The composite engineer is a rational and logical thinker; in that respect, the Tool Engineers hold to traditions. For engineering isn't so much a matter of degree as of mind; were the diploma the only qualification dynamic America might yet be trailing the parade of Progress. But because we developed initiative, because each man was free to carve out a career the hard way or the easier, as circumstances dictated, we did things in a new and novel way, did the things that "couldn't be done." But, it all took thought, deep, analytical thought, the deep thinking of the engineering mind. Well, all that is largely of a past era; we still need analytical thinking, only from now on there must be more of trained thinking. The new frontiers are becoming too complex for attack on other than scientific lines. So, we go to school, yet, now as ever, theory and practice must be reconciled, no matter how futuristic our projects, they've got to work. Hence, the engineer with practical training and a practical sense of proportion is as necessary as the advanced theorist with his vision of the split atom.

Yours for Progress,
Handy Andy

Local engineering service and warehouse stocks at principal industrial centers

Two More A.S.T.E. Chapters To Receive Charters

Two more chapters will be chartered by the American Society of Tool Engineers, in the next few weeks. One of these, at Elmira, New York, will take in the southern "tier" in New York State, while the second one will be chartered in Peoria, Ill.

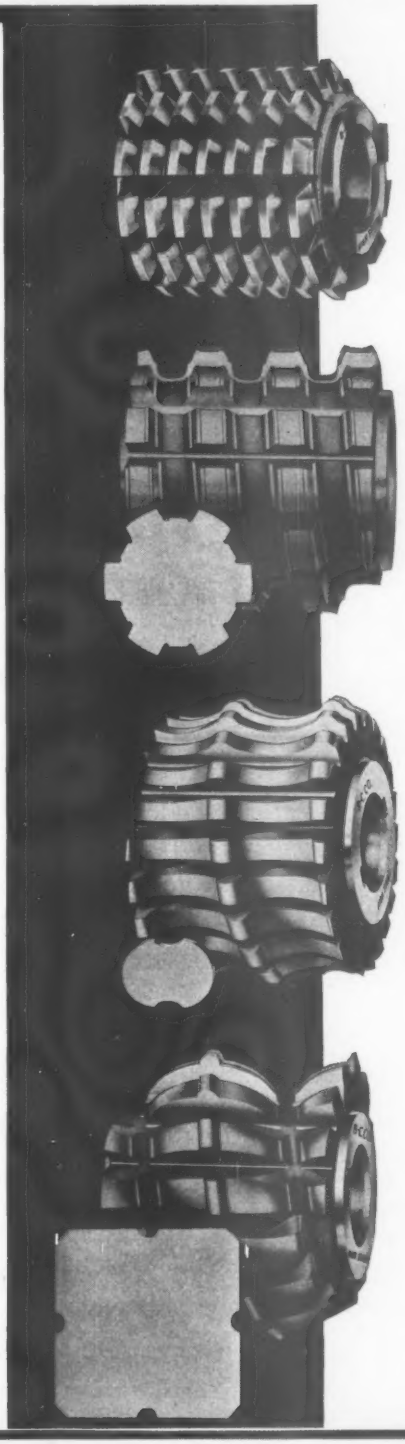
A new chapter in Moline, Ill., was chartered in December. The two additional chapters will bring the total to 25, scattered throughout the Industrial East and Middle West.

Use BARBER-COLMAN GROUND HOBS

For Accuracy, Service, Value

For greatest accuracy, uniformity and finest finish in the product . . . use ground hobs. For long tool-life, exact duplication of replacements, and greatest value per dollar of investment . . . use ground hobs.

Barber-Colman metallurgical research prescribes steel of special analysis exactly suited to specific hobbing conditions. Extensive use of hobbing in our own plant, and the manufacture of hobbing machines as well as hobs, qualifies Barber-Colman engineers to render expert advice and service. Special machines and carefully trained men are employed exclusively in the production of Barber-Colman ground hobs. Result, Barber-Colman hobs—ground or unground—are unexcelled in quality and value per dollar of purchase price. The unground hobs are perfectly satisfactory for ordinary work. When extreme accuracy and fine finish are required, ground hobs should be used; and this can be done most economically when Barber-Colman Hobs are selected. Try Barber-Colman Ground Hobs on your most exacting work . . . and if you have an unsolved hobbing problem, let Barber-Colman engineers figure on the answer.



Ground Hobs for gears, sprockets, ratchets, and similar parts having any practical tooth form or pitch.

Ground Hobs for spline shafts in any size, shape, and number of splines that can be hobbed.

Ground Hobs for curved shapes. Hob shown is for an impeller section requiring high accuracy and fine finish.

Ground Hob for straight-sided heading die. Note curved surfaces on tooth form, all finished accurately by grinding.

BARBER B-C COLMAN

PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

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Dumser & Schroeder
610 West Michigan St.

(Continued from Page 15)

coming up and we have loss from that but you could never find that mass because it only amounts to two parts in ten billions, but now let's look at the nuclear reaction.

I mentioned heavy hydrogen and the detyrium nucleus and if you mix that and another gram of hydrogen together it forms approximately two grams of helium, but the amount of energy instead of being two parts in ten billions given off the amount would be six-tenths of a percent and you can imagine the enormous amount of energy, and you will find that there is a six-tenths of a per cent of change in that.

Now in this relativity that Einstein talks about his equations show that mass and energy are equivalent. You all are used to Joule's equivalent where you take so much mass and say that corresponds to so much mass energy. Now that means the same thing only a little change in mass means a lot of energy.

Our atom-smasher, where these studies are being made, consists of a sealed tank capable of holding one hundred and twenty pounds per square inch.

We have belts which carry positive charges up and negative charges down, something like a belt carrying charges. We charge the upper electrode to about five million volts. Now we have another belt going up to our machinery in the top of this and we produce ions, that is, the charged nuclei of the elements. The ions of helium and detyrium are the most useful because of their mass relations. We feed them in an inlet pipe at a pressure of a fraction of a millimeter down to a very good vacuum. Now we have uniform electrical fields coming down so that charge has the force of a field gradiant and it is accelerated to an extremely high speed. They gain a speed of up around one hundred million miles an hour. Then it goes down out of a tube into what we call a magnetic analyzer. That is merely to separate the different impurities or charged particles. If a particle has a charge of one electron off, or two or three, they would just cause different reactions so we want to separate them and we put in a cross magnetic field. That throws them over to the side so we have three outlets and put the targets materials in and study the reaction.

Now those studies are made by finding at what voltage what reaction we have and what the binding forces are in the different elements. Of course, when one is split it gives off an enormous amount of energy and has other physical reactions which are measured by cloud chambers and gamma-counters. I won't go into that. That tells us what has happened.

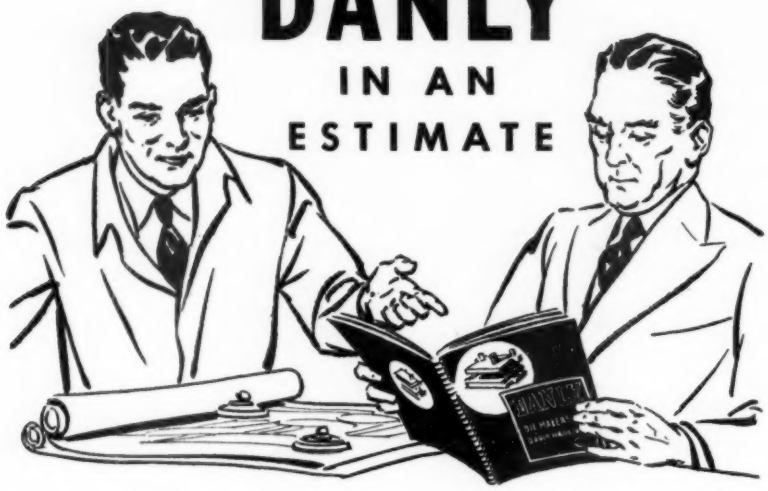
Now I would like, perhaps, to compare this to astronomy. If you had an astronomer and a comet came in view of his telescope he could watch it for a little while and then plot the orbit and tell us just where that is going. You see that in the papers every time a comet comes in. He can do this because he knows the laws of gravitation. The production of the mass is the square of the distance so we can tell that that will be an elliptic or some other conic section. He can tell you where that will be every night. Now he knows the laws of forces and therefore he can work out the trajectory. The physicist is hunting the laws so he has to make his trajectories and measure them and then he has worked out the laws. To do that they take millions of these particles, like a super-machine gun, and they bombard the particle. A particle will come through, come near a nucleus and be deflected and scattered and they study the scattering of these particles at different angles and by splitting matter specifically they can dope out just how big these nuclei are, what the forces are, what the laws are, and by the reactions they can get the effective cross-sections and what things have taken place.

We are sure from experience that fundamental knowledge usually is useful in industry and in our living conditions, and although we don't know what is coming out of this, we feel that this is one of the best approaches to get down to fundamentals.

THERE'S A GREAT COMMON INTEREST IN THAT WORD

"DANLY"

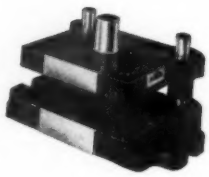
IN AN ESTIMATE



When Danly Die Sets are specified for the mounting of dies, it means:

—that the die maker is protected from lost man hours or added machining not included in his estimate.

—that the die user is protected from set-up and production delays, frequent regrinds and high stamping costs.



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DIE MAKERS—Include Danly Die Sets in Your Estimates

It will be good business for you both

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DANLY DIE SETS and DIE MAKERS' SUPPLIES

Their Dependable Quality Means Lower Cost Stampings

For

Precision Production Profit . . .

Norton Type C Semi-Automatic Grinders

DUAL Control and Electric Timing of the automatic cycle are new and valuable features.

The Dual Control permits use of the complete automatic cycle, sizing to a positive stop, or the operator-controlled cycle sizing to an indicator gauge.

Electric Timing provides a definite dependable time control.

Semi-automatic grinding in the Norton Type C is one way to reduce production costs. Even small lots of similar parts may be profitably ground in these machines.

Perhaps your work should be ground semi-automatically. Our engineering experience is at your service.

NORTON COMPANY, WORCESTER, MASS.

New York - Chicago - Detroit - Cleveland - Hartford - London

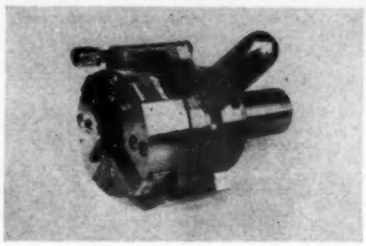
NEW *Equipment*

H & G Insert Chaser Die Head

A new style of H & G Insert Chaser Die Head for use on hand screw machines and turret lathes has been developed by The Eastern Machine Screw Corporation of New Haven, Connecticut. This new head uses the same Insert Chasers as other styles and is made in what is known as 101, 102 and 103 sizes, the latter size having a range from ¼" up to 1¼" in long threads and up to 1½" diameter in short threads. All three sizes of heads use the same chasers where the sizes are within their rated capacities.

These heads have many of the characteristics of the Style DM designed for Brown & Sharpe Automatic Screw Machines but which have also been found efficient on hand screw machines.

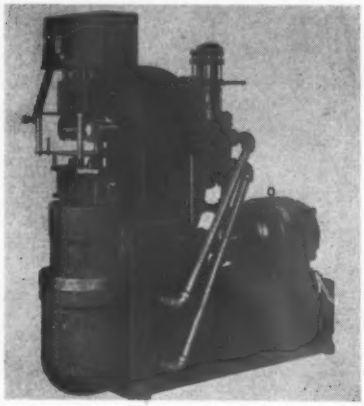
The drive is by strong torque arms located



a maximum distance from the center. The head may be tripped either by pull-off or by front end contact, the latter being especially desirable for close to shoulder threading or for cutting extremely short threads. Fine adjustment for length of thread is self-contained on the head itself. The shank of this head is detachable and can be furnished in any reasonable diameter. There is a clearance hole through the shank making it possible to cut any length of thread in diameters up to the die head's normal capacity.

Hanna Riveting Press

"The sixty-ton Hanna Electric-Hydraulic Riveting Press and fixture shown in the accompanying illustration was designed for the riveting of automobile right and left hand front wheel control arm assemblies. This involves multiple riveting at the rate of forty-five rivets per minute.

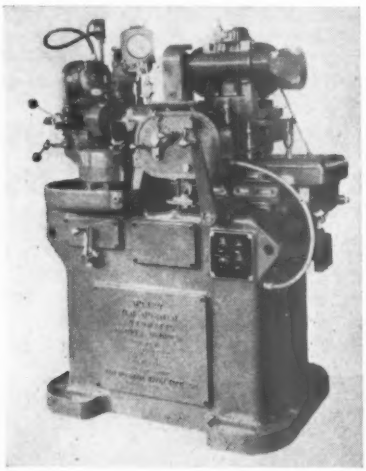


Initial work or closing movements are inaugurated by depressing a duplex control lever. Thereafter the entire cycle of clamping the parts, riveting and the return of the ram to its starting position is automatic. Control arrangement incorporates two important safety features —release of lever will instantly reverse pressure stroke and, what is equally important, a repeat cycle cannot take place.

Maximum pressures may be regulated to the work thus holding power consumption to a minimum and avoiding distortion of the work by reason of excess tonnage. At the maximum fluid pressure this riveter exerts 60 tons on the dies. It is also available in capacities of 20, 40 and 60 tons. The reach and gap may be varied to suit the work."

New Van Norman Automatic Internal Radius Grinder

Recently introduced by the Van Norman Machine Tool Co., Springfield, Mass., is this new radius grinder, Model 120, designed particularly for grinding raceways of the smallest ball-bearing outer rings up to the 204 size (approximately 1⅞" diameter). Model 120 provides the most satisfactory method for small-raceway grinding in the aviation, instrument, electrical and automotive fields, also in general industry wherever small diameters must be spherically ground.

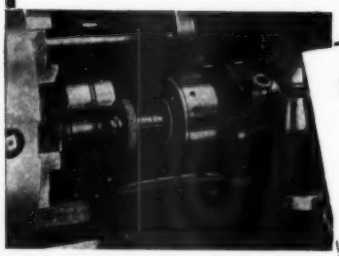


To operate, load the race in the holding fixture, and start the machine by a finger-touch lever which automatically moves the wheel into grinding position and coincidentally retracts the

(Continued on Page 34)

For 100 Jobs In Your Shops

USE THE GRINDER THAT "GOES TO THE WORK"



On an engine lathe. Ample power to drive a 1½" x ⅛" wheel on heat treated steel.

On a universal milling machine grinding a spiral cutter.

Grinding radius on heat treated drawing die. Full set of grinding wheels standard equipment.

This isn't "just another tool post grinder." It is a powerful, high speed tool — ⅜ H.P. Universal motor, 18,000 R.P.M. — and it can be used for an infinite variety of grinding jobs. With the Stanley Tool Room Grinder and its complete accessories, the jobs you can do are limited only by the ingenuity of your workmen. It is a Stanley Quality tool in every respect.

Ask your distributor for a free demonstration. Or write for descriptive literature. Stanley Electric Tool Division, The Stanley Works, 149 Elm Street, New Britain, Conn.

Plenty of power for cutting brass, aluminum and similar non-ferrous metals. Recessing a templet is easy.

STANLEY ELECTRIC TOOLS

A Complete Line for Industry — "Cost Less Per Year"

18 DIFFERENT BORING AND TURNING JOBS -- DONE WITH ONLY ONE SET OF WETMORE TOOLS

-- TIME AND MONEY SAVED FOR LARGE IMPLEMENT MANUFACTURER

These Features Made This Performance Possible:

—adjustments made faster than on any other tools used in this plant which means dollars saved in setup time and increases productive time of operator.

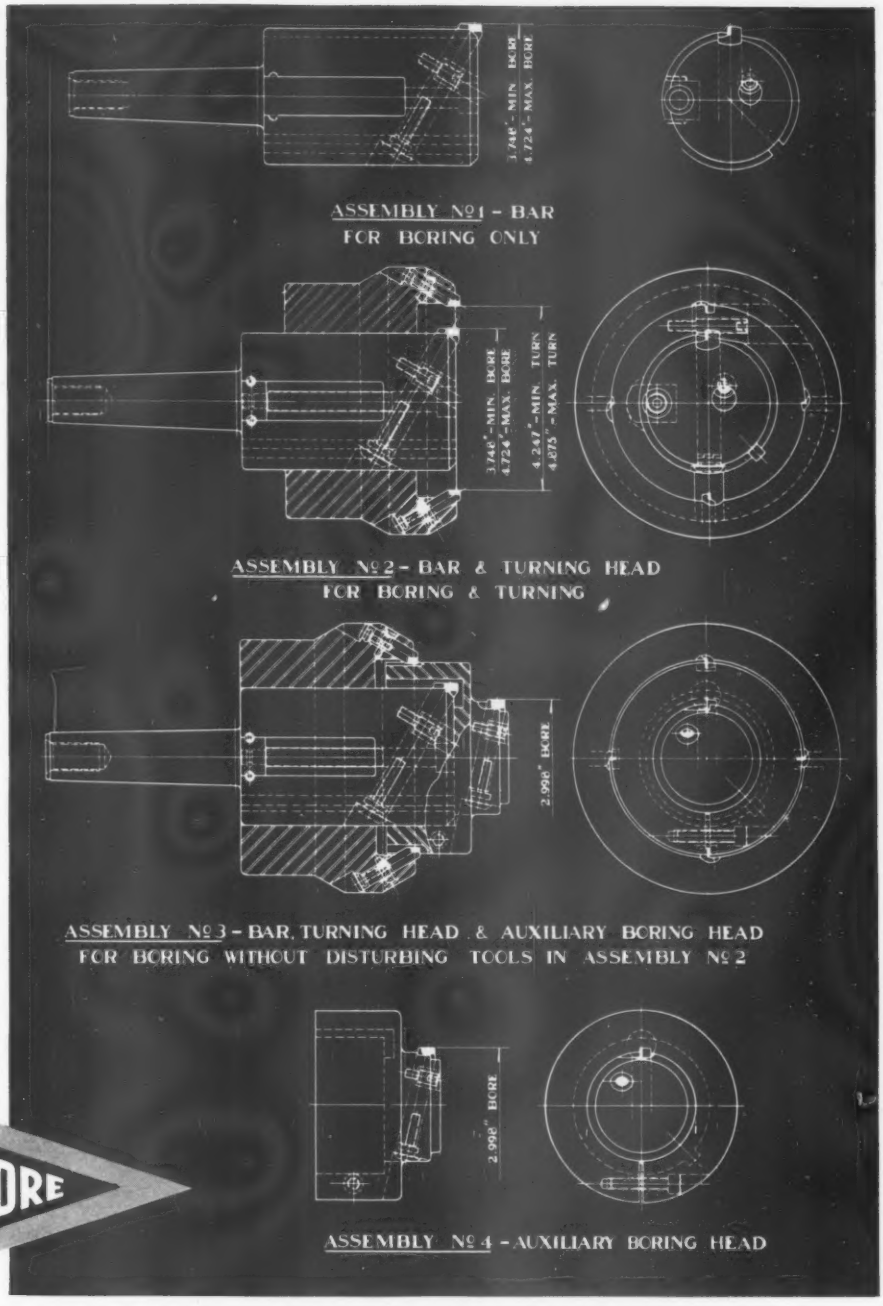
—extremely accurate adjustment made by means of adjusting screw; Wetmore patented wedge-lock holds cutting tools rigidly and solidly.

—tools illustrated bore and turn 18 different jobs:

Assembly No. 1—used for boring on 5 jobs.

Assembly No. 2—used for boring and turning 9 jobs.

Assembly No. 3—used for boring 4 jobs.


3.746" - MIN. BORE
4.724" - MAX. BORE
ASSEMBLY №1 - BAR
FOR BORING ONLY
3.746" - MIN. BORE
4.724" - MAX. BORE
4.247" - MIN. TURN
4.875" - MAX. TURN
ASSEMBLY №2 - BAR & TURNING HEAD
FOR BORING & TURNING
2.996" BORE
ASSEMBLY №3 - BAR, TURNING HEAD & AUXILIARY BORING HEAD
FOR BORING WITHOUT DISTURBING TOOLS IN ASSEMBLY №2
2.996" BORE
ASSEMBLY №4 - AUXILIARY BORING HEAD

WETMORE

Send in your drawings—Wetmore engineers will design tools to reduce tool-setting time and cost per piece machined. See your Wetmore representative for many other surprising applications.

WETMORE REAMER COMPANY

Dept. TL 420 North 27th Street **Milwaukee, Wisconsin**

NEW EQUIPMENT

(Continued from Page 32)

wheel to compensate for stock removal. Workhead automatically starts rotating and oscillating, wheel automatically feeds into the work. When race is ground to size, wheel automatically removes to unloading position, workhead stops. Complete grinding cycle functions automatically by simple standardized electrical controls concealed in back.

The No. 120 is arranged not only for electric gaging, but also with an electric control on the feed drum so that when the wheel is fed to point of proper size, the slide will automatically remove to unloading position.

To provide the high workhead speeds needed, No. 120 has a motorized workhead delivering 2,000 RPM to the workhead spindle, and rigidity far in excess of machine capacity. Wheel spindle operates up to 40,000 RPM, driven by a 3 HP motor belted to a ball-bearing jackshaft belted in turn to the wheel spindle. Drive unit is mounted directly on the wheel slide. Speed changes to wheel spindle are by pulley changes on the spindle drive unit. Every feature of the No. 120 contributes directly to the highest degree of finish, accuracy and production.

Gilman Four-in-One Tool Room Machine

The Gilman Engineering Works has introduced the new Gilman Four-in-One Tool Room Machine. It combines a Precision Lathe, Horizontal Mill, Vertical Mill and Drill Press.

Specifications:

(1) Precision Lathe with 9" swing, is 12" between centers with a 24" bed. Tailstock is adjustable to take up wear. An attractive feature is the device for clamping the compound rest in any position on the lathe bed.

(2) Horizontal Mill has 4" x 18" table, with 10" travel.

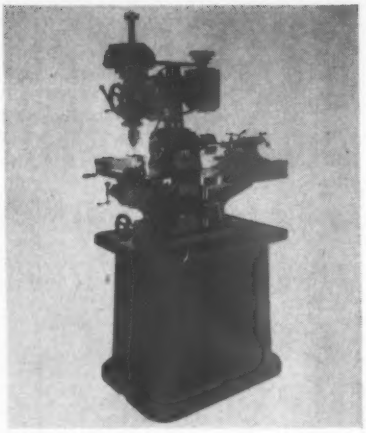
The horizontal mill and lathe are powered by a one h.p. reversible motor, mounted in the base. There are eight spindle speeds from 80 to 2500 r.p.m.

(3) The Vertical Mill quill may be raised or lowered four inches.

(4) The Drill press is provided by turning the Vertical Mill head 90 degrees over an 8½" table and having 7½" between table and spindle.

The vertical mill and drill press are powered by a one-half h.p. motor (reversible). Spindle speeds range from 390 to 2200 r.p.m.

Timken Bearings are used throughout.



Vimcolighting assures proper illumination of work.

The units are designed within precision limits.

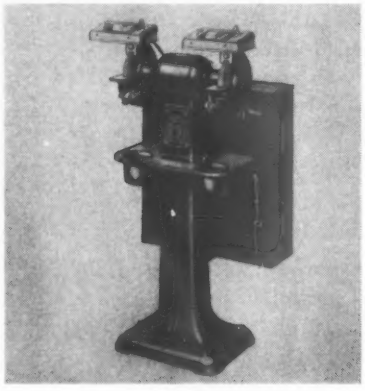
The machine weighs approximately 1000 lbs. and is finished in an attractive fine baked Art Metal Finish.

Provide a
"Selective" control
The simple start and stop of any power movement, the most complex interlocking sequence of operation, and all the varying operation requirements that go between are handled equally well by T-J Pneumatic Controls.
The Machine above—the operator steps on the foot pedal, the work is clamped, the clutch is engaged, and after the work is finished it is automatically released and the clutch is disengaged. Operation, timing, and placement—when and where you need them—with T-J Pneumatic Controls.
Bulletin No. 3 will give you more facts about these systems. Write for it now, include a description of your problem so that we may assist you in the selection of the proper units.
THE TOMKINS-JOHNSON COMPANY
624 North Mechanic Street
JACKSON, MICHIGAN
Agents in Principal Citi
REMOTE T-J CONTROLS
PNEUMATIC

New Device Reduces Dust Hazard in Tool-Grinder Opperation

Removal from the air of fine dust particles caused by tool-grinder operation has long been an annoying problem for the average shop.

In many cases necessity requires that the grinders be located where it is difficult, expensive or impossible to attach them to a dust-removal system, if such a system is available. In most shops such systems are the exception. Some attempts have been made on large production and toolroom grinders to incorporate a complete self-contained dust-removal system, with motor, blower and tank, but these are not adaptable to small tool grinders.



The Delta Manufacturing Company of Milwaukee has recently developed a self-contained dust-removal cabinet which may be attached to any Delta pedestal grinder. The cabinet contains dust filters which trap practically all of the dust carried down the discharge chutes of the grinder. The cabinet is also fitted with baffles which discharge all of the heavy particles into the cabinet base, where the dust may easily be removed.

The unit requires no power, and, since it is completely self-contained, the grinder to which it is fitted may be used anywhere in the shop. It is remarkably efficient, it is claimed, in action, and is said to reduce dust hazards incidental to tool-grinder operation to a considerable extent.

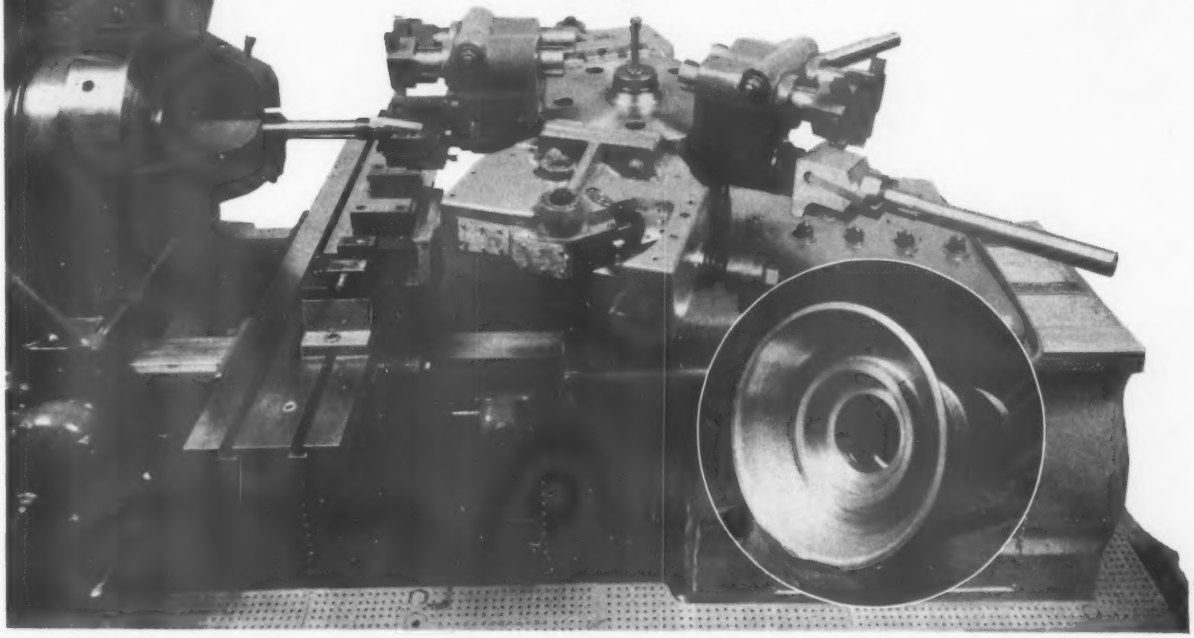
Cushioned Air Cylinders in "No-Cushion" Price Class

A complete line of air cylinders with non-adjustable cushion-heads is now available in the same price range as non-cushioned air cylinders. This new development was recently completed by the Galland-Henning Mfg. Co.,

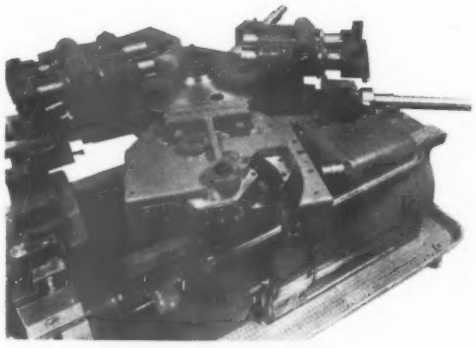
(Continued on Page 36)

POTTER & JOHNSTON TOOLING DATA ON

Steering Spindles



HERE'S THE JOB — *an Example of* POTTER & JOHNSTON *Efficiency*



CLOSE-UP OF TOOLING

● The combination of a *Standard 6-DRILL Potter & Johnston Automatic Chucking Machine* and an outfit of special tools developed by P. & J. engineers, furnished an outstanding example of the versatility of P. &. J. machines. The special form of steering spindle illustrated is produced from a No. 4615 S.A.E. forging. There is a large amount of stock to remove, accuracy is essential and the internal-external arcs, are all factors tending to make the solution of the problem one of general interest. The power and rigidity necessary to the satisfactory performance of the two chucking operations involved are contributed equally by the machine and the special tooling.

● *Wide Spread machine bed and turret slide ways of hardened and ground steel, automatic binding of the turret after index, spindle of liberal dimensions mounted on precision anti-friction bearings* and *the piloting of all turret tools,* all combine to assure long tool life and also make possible the use of *maximum speeds and feeds.*

● While your own production problems may not involve work of this same character, the manner in which we have overcome the obstacles presented indicates the constantly expanding field for Potter & Johnston Automatics *equipped with proper special tooling.*

Our Engineering Service is at your disposal.

POTTER & JOHNSTON MACHINE COMPANY

THE PIONEER MANUFACTURER OF AUTOMATIC CHUCKING EQUIPMENT

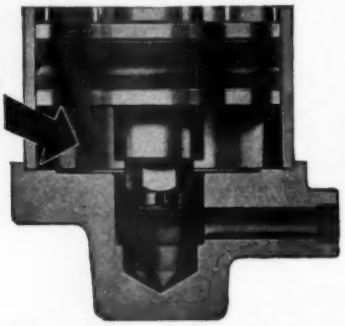
PAWTUCKET, RHODE ISLAND

NEW EQUIPMENT

(Continued from Page 34)

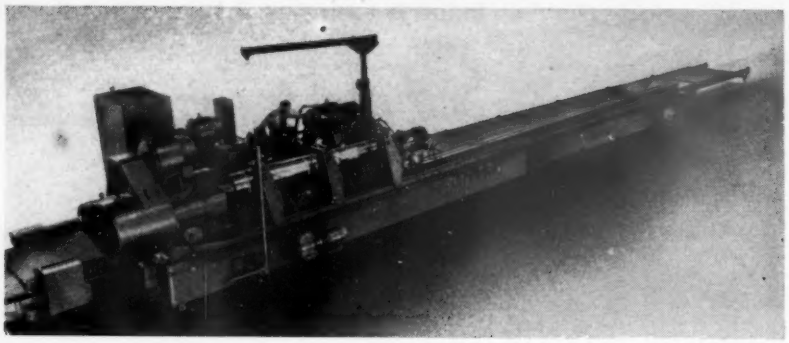
makers of NOPAK 2, 3, and 4-way operating Valves for air, oil and water.

The purpose behind this new type of Cushioned Air Cylinder was to eliminate the noisy, destructive, metal-to-metal impact common to all non-cushioned cylinders. Cylinder life is greatly



prolonged by this new built-in air cushion. At the same time, it assures smoother, more efficient operation and lower maintenance costs for all air powered equipment. These benefits were definitely proved by exhaustive performance and endurance tests under actual working conditions.

Of course, NOPAK Air Cylinders with adjustable cushion-heads are recommended by the manufacturer for those applications where accurate control of "cushioning" is required at the end of the piston stroke.



36" x 480" Cylindrical Grinder With Traveling Wheel Head

Norton Company, Worcester, Massachusetts has just completed what is believed to be the longest grinder of its type in existence. This huge grinder will accommodate work up to 36" in diameter and 40' long. Steadyrests for supporting long work between centers have a capacity range of 4" to 24". Straight rolls and long, solid or hollow shafts can be ground in the machine straight and round within extremely close limits for accuracy, and taper work up to 5° included angle can be ground by swiveling the work table.

Exceptional accuracy for so large a machine is required by the customer. The specifications based on grinding a machinery steel shaft 4" diameter and 33' long are: the shaft must be straight within .0008" and round within .0002". It is interesting to note that due to a very accurate method of aligning the 60-foot base ways, almost perfectly straight work is secured. The first test bar ground which was a hollow tube 4" diameter and 16' 8" long was round within the required tolerance of .0002" and straight within .00025".

The total overall length of the machine is 80', the base and work table each being made in two sections, butted end to end, with hand scraped joints and held in position by tapered bolts fitted to reamed holes. The base castings are each about 30' long and weighed approximately 52,000 pounds each when received from the foundry in Providence, Rhode Island where they were cast. The base is 8' wide, the rear portion having scraped ways 4' apart and each 6" wide for supporting the table or platen on which the wheel head and all the driving and control mechanisms are mounted. The front portion, which is not quite as long, has its entire top surface hand scraped perfectly flat on which surface the swiveling work table is placed.

An immense headstock mounted on the left end of the work table but movable along the table is driven by an adjustable speed 15-horse power motor through multiple vee belts and a silent chain running in oil for the final reduction to the work drive plate. The footstock, of the sliding spindle type, is provided with a worm and gear reduction for easy movement of the spindle by hand wheel. Both headstock and footstock centers are 4½" diameter and equipped with grease gun connections for forcing lubricant to the center points while the work is revolving on the centers.

Electrical control apparatus is housed in two steel cabinets on the table, the smaller of which is situated close to the operator's station and carries the rheostats and push button stations by which the stopping, starting and speed of every motor is controlled by the operator without leaving his position beside the grinding wheel and overlooking the work being ground. An enclosed trolley take-up along the rear of the machine keeps the six electric cables for the power supply from becoming entangled as the table makes its 40-foot travel.

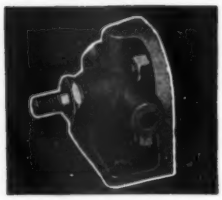
A total of eight motors is required as follows:

Wheel drive—25 H.P. adjustable speed
Work drive—15 H.P. adjustable speed
Table drive—5 H.P. adjustable speed, reversing service
Swivel table adjustment—3 H.P. constant speed
Oil and coolant pump—2 H.P. constant speed
Steadyrest coolant pump—1 H.P. constant speed
Wheel head rapid traverse—1 H.P. constant speed, reversing service
Wheel spindle oil pump—¼ H.P. constant speed
Total aggregate horse power—52¼
Total net weight of complete machine with motors, controls, steadyrests, etc. about 185,000 pounds.

(Continued on Page 38)

AIR CUSHIONS

in *All* NOPAK Air Cylinders Eliminate Costly Metal-to-Metal Impact



NOPAK Cylinder Head with built-in, non-adjustable air cushion. Adjustable head can be furnished on one end only, if desired.

. . . what's more, the new type, NOPAK Air Cylinders, with Non-adjustable, pneumatic cushion-stop, sell in the *same price range as non-cushioned cylinders!*

Now, instead of choosing between cushioned and non-cushioned cylinders, you choose between adjustable and non-adjustable cushion heads. Whichever you specify, you are sure of relief from noisy, wearing, piston-hammering, longer life for pistons, and cup-leathers, lower maintenance costs, and smoother, more efficient performance.

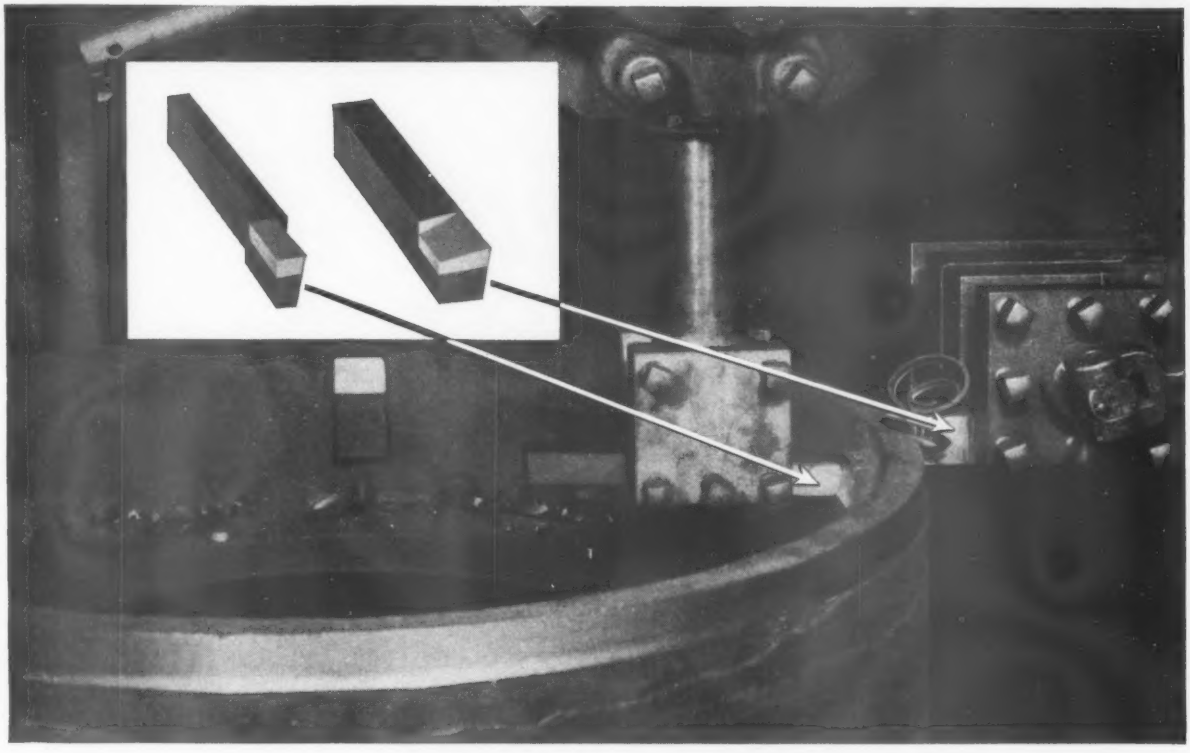
Both types of NOPAK Cushioned Air Cylinders have Special Composition Cup Packing and extra-wide piston bearing to protect cups from excessive wear and friction. Write for New Illustrated Bulletin.

NOPAK Cushioned Air Cylinder with Pendulum Mounting. All standard mountings available.

GALLAND-HENNING MFG. CO.
2757 S. 31st STREET
MILWAUKEE • WIS.

NOPAK VALVES and CYLINDERS

Haynes Stellite "2400" tools machine tough alloy steel casting



TWO Haynes Stellite "2400" welded-tip cutting tools are shown here turning and boring a 36-inch diameter brake drum casting for a manufacturer of oil well machinery. The casting is a tough manganese-molybdenum steel, heat-treated to 360 Brinell hardness. Numerous sand holes and hard spots as well as intermittent cutting add to the strain on the tools. Yet the Haynes Stellite "2400" tools cut the alloy steel cleanly and smoothly at 47 surface feet per minute with a feed of 0.068 inch per revolution and a depth of cut varying from 1/16 to 3/8 of an inch.

Performance such as this indicates how Haynes Stellite "2400" cutting tools may be able to reduce tool and production costs in your shop. Write for "Haynes Stellite '2400' Metal Cutting Tools," a new booklet with pictures and operating data on all phases of machining with these superior tools. A Haynes Stellite engineer will call, at your request, to analyze your machining applications and help you determine where you can save money by using these improved cutting tools. There is no obligation

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

"Haynes Stellite" and "2400" are registered trade-marks of Haynes Stellite Company.

2400 HAYNES STELLITE TRADE MARK

Red-hard, wear-resisting alloy of cobalt, chromium and tungsten

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

Chicago · Cleveland · Detroit · Houston · Los Angeles · New York · San Francisco · Tulsa

General Office and Works—Kokomo, Indiana
Foreign Sales Department—New York City

Haynes Stellite hard-facing rods and information on other Haynes Stellite Company products also are available through all apparatus shipping points of The Linde Air Products Company

NEW EQUIPMENT

(Continued from page 36)

Rafter Steel Press Brake

Manufacturing rights for the Rafter Steel Press Brake have been acquired by the Ferracute Machine Company, Bridgeton, N. J.; and Bryant Machinery & Engineering Company, 400 West Madison St., Chicago, has assumed exclusive selling rights and will market the line through its dealers.

Differing radically in principle from conventional machines, the Rafter Steel Press Brake employs a new patented design wherein the ram is pulled downward into the work, power being applied from below the dies. Reversal of method of applying power to the ram is, an important advance in press brake design, it is claimed, because it permits other valuable improvements which eliminate many disadvantages.

The Rafter Press Brake consists of only two major members—the ram and the bed. The patented design entirely eliminates heavy end housings tied together at the top with a heavy crown. Reduction in size and weight of end housings, entire absence of a crown member and removal of drive mechanism from the upper part of the machine eliminate dead weight and permit concentration of weight and strength in the working parts where they are most effective in resisting deflection and producing work of highest accuracy.

The bed is an unusually deep section of extra heavy, single-thickness rolled steel plate which gives maximum resistance to deflection from ram pressure. The connecting rod eccentrics are carried in the ends of the bed member, being centered transversely directly below the center of the dies. The die surface is wide and is provided with slots for clamping and a longitudinal groove for accurate alignment of die holder.

End frames are made of rolled steel plate welded to the bed. They serve principally as guides for the ram. Not being subjected to tension or torsion stresses, they cannot deflect and the dies, therefore, are always in perfect alignment. The extra-long ram guides are of the square locked type.

The ram is made of an extra heavy, single-thickness rolled steel plate with a heavy horizontal rib welded to the back. Absence of crown member and overhead drive mechanism allow a ram section of unusual vertical depth, far greater than on other machines of equivalent capacity. The only mechanism carried on the ram is the self-contained ram adjusting device. The connecting rods extend through slotted openings near the ends of the ram, close to the end frames, and the trunnion nuts are centered in the ram plate.

Ram adjustment is by means of a small high-torque reversing motor mounted on the back of the ram and connected to the adjusting screws through worm gearing. Control of the adjusting motor is through a reversing switch mounted on the front of the machine. The heavy adjusting screws are always in a vertical position and, therefore, are not subject to bending strain. Trunnion nuts have unusually long bearing on the screws and, regardless of adjustment of ram, always have the same number of threads in contact with the screws. The screws cannot be run part way out of the nuts when adjusting for extremely short die opening. Bed frames are full-throated and connecting rods offer no interference to dies for the full length of the ram and bed.

The Rafter patented friction clutch is of generous proportions and is mounted on Timken tapered roller bearings. Easy adjustment is provided for any desired pressure load. The clutch is engaged through a treadle bar along the front of the machine.

The Rafter patented quick-release safety overload device eliminates the usual trouble, delay and expense encountered when the brake stalls at bottom of stroke due to overloading, misadjustment of ram, or other causes. This release device is a positive-action mechanism incorporated in the clutch. It engages automatically when the clutch is reversed, instantly backing the ram and releasing the work without damage to the dies.

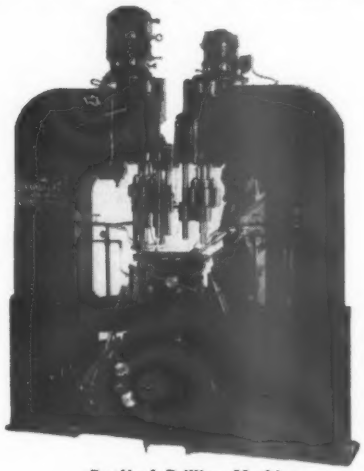
A clamp is built into the ram for holding the upper die. This clamp will hold straight-shank, L-shank or T-shank dies. The lower die holder is provided with a key fitting in the groove in the bed, insuring exact die alignment at all times. Rafter design makes unnecessary the questionable practice of using a floating die holder to maintain die alignment.

In short, the Rafter Brake, by virtue of the new principle of applying power below the dies, puts to work in the bed and ram steel which, it is said, is dead weight in the conventional design. The Rafter Brake has been perfected and tried over a period of years and plans have now been completed to manufacture on a large scale.

Bradford Drilling Machine

The Bradford Machine Tool Co., 657 Evans Street, Cincinnati, Ohio, has recently furnished the manufacturer of a popular make of automobile the machine shown here for performing a multiplicity of operations on the oil pump bracket.

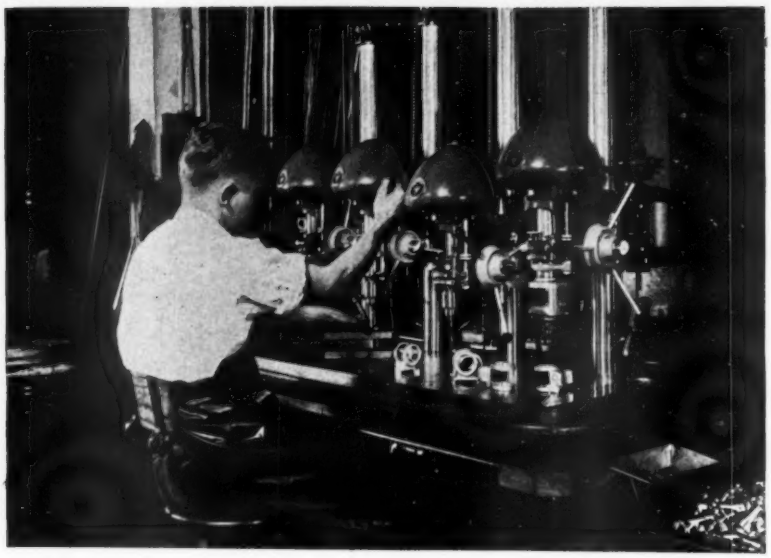
The machine incorporates the use of six Bradford automatic drilling units and is almost entirely of normalized welded steel construction with the exception of the housings of the units, and the fixtures. A five-station horizontal index table carries the quick-acting type fixtures which hold one part at each station. Interesting features include the use of three inverted units with sealed spindles which come up to the work through the chip and coolant trough; an inverted position for the work so



Bradford Drilling Machine

(Continued on page 45)

Low First Cost PLUS Low Maintenance Cost



Just Look at these Figures!

16,016 hours operation at an average yearly maintenance cost of $1.80 per spindle. That is the record made in one plant by Delta Low-Cost 4-Spindle Drill Presses.

For "four long years" these four-spindle Delta drill presses ran 14 hours a day—and in all that time there were no repairs necessary; they required no lubrication; the only maintenance cost was for inexpensive V-belts, renewed every six to eight months.

Low first cost, practically no maintenance, no lubrication problems, high adaptability and thorough operating satisfaction—these are only a few of the things that Delta machines offer you.

Manufacturers all over the country have adopted Delta tools to increase production and flexibility and reduce costs. Send coupon for special circular on Delta Drill Presses.

DELTA MFG. CO.

628 E. VIENNA AVE., MILWAUKEE, WIS.

Delta Mfg. Co.

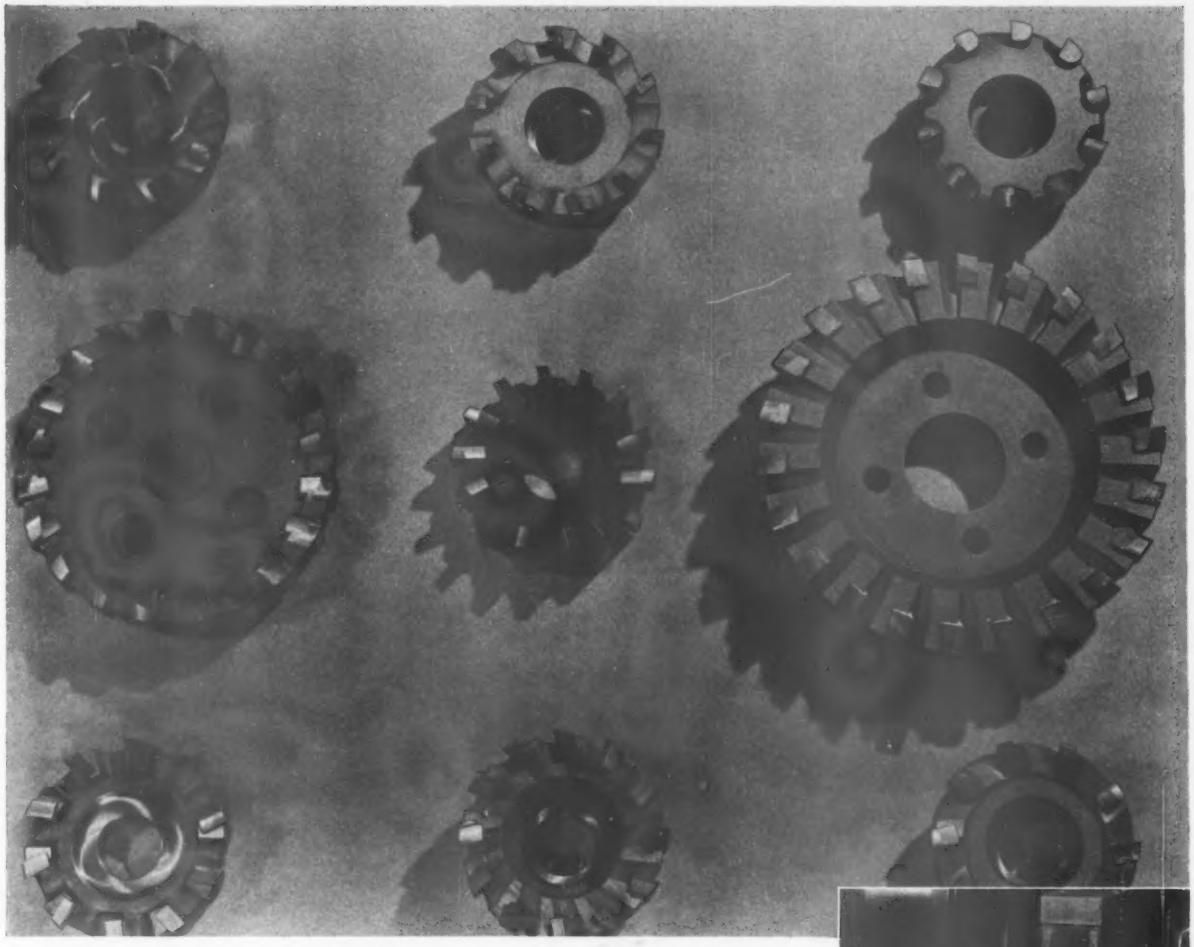
628 E. Vienna Avenue, Milwaukee, Wis.
Gentlemen: Please send me special illustrated circular on Delta Low-Cost Drill Presses.

Name.....

Firm.....

Address.....

City.....State.....



CARBOLOY-TIPPED FACE MILLS

Any type of adjustable face mill can be tipped with Carboloy cemented carbide. A few of the many well-known types are illustrated above.

Carboloy-tipped face mills provide greater accuracy, longer cutter life, improved finish, minimum distortion of work and lower cost per piece milled. Widely used not only on large quantity production work but also on small run job shop applications.

Get these extra savings on your milling jobs. Send coupon for details.

Here's an excellent example of the way Carboloy tools help to increase profit-margins. This job of milling cast iron valve bodies, using two Carboloy milling cutters, saves $276.00 every 36 hours.

CARBOLOY COMPANY, INC.
DETROIT, MICHIGAN
Chicago • Cleveland • Newark • Philadelphia • Pittsburgh • Stamford, Conn. • Worcester, Mass.
Canadian Distributors: Canadian General Electric Company, Ltd., Toronto

The Mark of CARBOLOY
REG. U.S. PAT. OFF.

Mail today

Carboloy Company, Inc.,
2983 E. Jefferson, Detroit, Mich.

Give us data on use of Carboloy on the following make of face mill:

Make:_____ Size_____

Name_____

Title_____

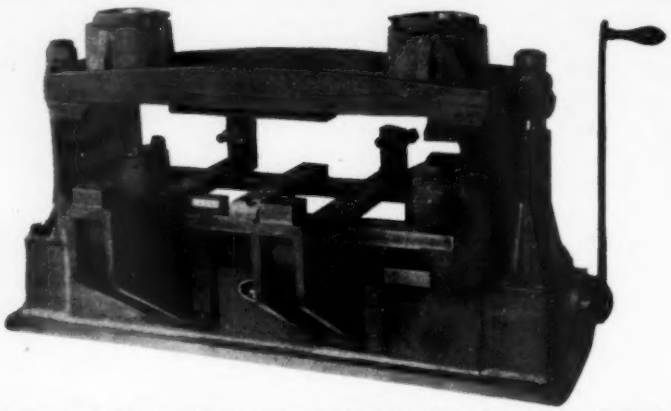
Company_____

City_____ State_____

CARBOLOY

REG. U.S. PAT. OFF.

CEMENTED CARBIDE TOOLS



A LARGE CASTING IS HANDLED WITH EASE ON A STANDARD JIG

A larger L H type fixture is equipped with elevator attached to head. The part is pushed in on rails to the approximate stops. The downward motion of head drops the part on cup locators for machining the large boss holes. Upward motion of head lifts casting from the locators.

MORE PRODUCTION WITH LESS OPERATOR FATIGUE

SWARTZ TOOL PRODUCTS CO., INC.

5259 Western Avenue — **ASK FOR CATALOG 238—I** — **Detroit, Michigan**

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Tulsa, Okla.—Brammer Machine & Tool Service Co. Inc.

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Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
St. Louis—Mill Supply & Machinery Co.

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Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
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VERTICAL COMPARATOR

For *direct* measurement of lengths and diameters with a glass master scale and spiral microscope. Size is read immediately to .00005 in. without reference to gauge block combinations.

Catalog Fe 160 Upon Request

CARL ZEISS, INC.

485 FIFTH AVENUE, NEW YORK

728 SO. HILL ST., LOS ANGELES

Representatives in Principal Cities

CARL ZEISS JENA

Is Factory Worker Through at 40?

(Continued from page 9)

labor force has been growing gradually older, and that at each census from 1890 to 1930 the median age of male workers was 7 or 8 years higher than that of female workers. The median age of gainful workers 10 years old and over was for males 32.9 in 1890, 33.4 in 1900, 34.1 in 1910, 35.7 in 1920, and 37.4 in 1930. . . ."

Our Uncle Sam's reports and his easily-read chart show that the old men are getting along pretty well in industry as a whole.

An Old Man's Paradise!

Now here's a report received 18 days later from a local automobile company employing the most modern high production machinery. The average age of all the men in the entire plant on November 18, 1938, was 39.4 years.

21% at that time were between the ages of 20 and 30.
31% at that time were between the ages of 30 and 40.
30% at that time were over 40.
14% at that time were over 50.
4% at that time were over 60.

48% of the entire plant personnel over 40 years of age! Fellow Tool Engineers, we'd better stop! We're making it an old man's paradise! That report certainly indicates modern machinery is making the task light enough for the man past 40.

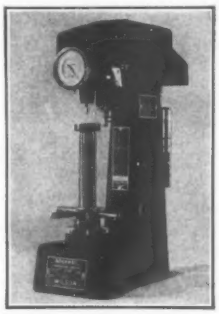
The National Industrial Conference Board in 1937 reported as the result of a study of 306 industrial plants that the highest earning peak of all employees was in the age group of 35 to 44.

The following extracts are from Mr. Alvan Macauley's comments on a report from the Automobile Manufacturers Association and though published in 1935 they are worthy of further meditation.

"This data should be of great value in obtaining a more correct appraisal of the problem of the older worker,

(Continued on page 45)

ROCKWELL
TRADE MARK REG. U. S. PATENT OFFICE
HARDNESS TESTER



BE it for research work or testing tools; be it for hard or soft metal; be it for occasional tests or for thousands per day; be it any of those things and more besides — there is no hardness tester to equal what we can make for your needs.

WILSON
MECHANICAL INSTRUMENT CO., INC.
380 Concord Avenue New York

only Wilson makes "ROCKWELL" Testers

CUSHMAN CHUCKS

THE CHUCK BUYER'S GUIDE TO A COMPLETE ENGINEERING SERVICE

The Cushman Catalog is a complete and detailed guide to modern chucking equipment. It gives you sizes, prices, blueprints and engineering data for all standard Cushman Chucks (with the exception of Power Chucks and Units), including chucks for the new American Standard Spindles and also those for the Cam Lock and Long Taper Key Drive Spindles.

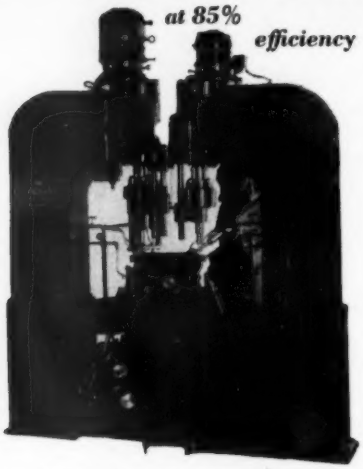
Yet this catalog, complete as it is, can cover only a part of the complete chuck engineering service available to you through the Cushman Organization. For three-quarters of a century Cushman Engineers have kept pace with the advance of metal working machine and tool design, constantly improving the technique of precision chucking, and developing new work-holding methods to meet both standard and special requirements.

Always remember that the benefits of this unique experience record and the unusually complete facilities available in the Cushman plant, are at your service for solution of special chucking problems, whether the parts you machine are weighed in fractions of ounces or thousands of pounds. Write us.

Send for your copy of
CUSHMAN CHUCK CATALOG No. 55

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONN.
Chucking Engineers since 1862

PRODUCTION
150 PER HOUR
at 85% efficiency



An example of Bradford production efficiency is shown in the machine above. This five-station horizontal index table machine is used by a popular make auto manufacturer to drill, tap, face, counterbore and coredrill an oil pump bracket. It embodies three inverted units, with sealed spindles, which come up to the work through the coolant trough; fully enclosed motors; synchronization of all movements by limit switches and relays, and built in wiring and control panel.

Write for further details on this and other Bradford PRODUCTION Equipment

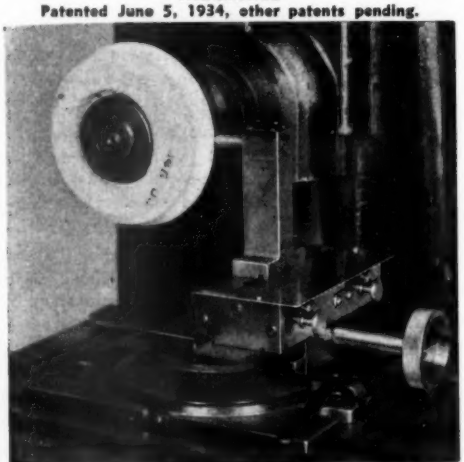
THE BRADFORD MACHINE TOOL COMPANY

Cincinnati (Est. 1840) Ohio

DEALERS WANTED FOR SOME TERRITORIES

VINCO ANGLE TANGENT TO RADIUS DRESSER
for Internal, External and Surface Grinding Machines

Patented June 5, 1934, other patents pending.



One of the outstanding features of the Vinco Dresser is the basic patented principle of dressing angles and radii on abrasive wheels from the same axis without moving the diamond, angles and radii are always accurate and tangent. The illustration above shows The Vinco Dresser in use on a surface grinder dressing angles and radii on an abrasive wheel. The Vinco Dresser is precision made by highly skilled mechanics, Dresser parts subject to wear are hardened, rough ground, normalized, finish ground and lapped. Stops on the Index Plate permit the setting of the Dresser at any desired angle for production grinding. The Vinco Dresser will save you 75 per cent in dressing costs and eliminate all your worry. It is fully guaranteed to be satisfactory.

Send for Descriptive Circular

VINCO TOOL COMPANY

7350 Central Avenue Detroit, Michigan

GLENZER ADJUSTABLE ADAPTERS
For Multiple Spindles

STANDARD EQUIPMENT FOR ALL DRILLING REAMING AND TAPPING MACHINES.

ADOPTED AS STANDARD BY LEADING AUTOMOTIVE AND MACHINE TOOL MANUFACTURERS

Utility Tools

THE J. C. GLENZER COMPANY

6463-6477 Epworth Blvd.

DETROIT MICHIGAN

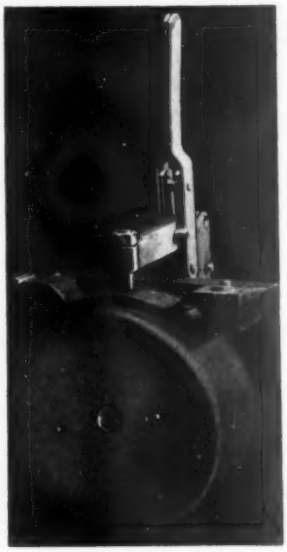


Illustration shows a Knu-Sine, Toggle Clamp used in a welding operation.

KNU-SINE
TOGGLE CLAMPS

The most practical and inexpensive method of holding production parts in fixtures, dies and jigs.

INEXPENSIVE

AUTOMATICALLY LOCKS INTO POSITION

INSTANT RELEASE

QUICK ADJUSTMENT

Manufactured by world's largest producer of Toggle Action Holding Fixtures.

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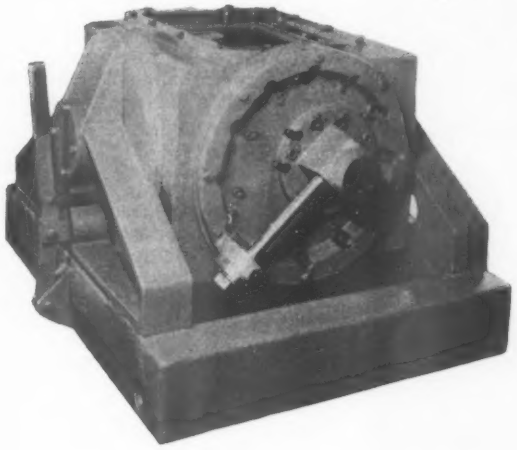
WHY NOT?

PLACE YOUR DIE, JIG, FIXTURE AND SPECIAL MACHINE REQUIREMENTS WITH AN ORGANIZATION POSSESSING

A Modern Plant—Adequate Equipment— Eighteen Years of Specialization



TRUNION JIG, TRANSMISSION CASE
Designed and Built by Q-C

We also manufacture a complete line of "Standardized" Drill Jigs and Fixtures.

Rotary Index Tables

Multiple Spindle Drill Heads

Locating Pins and Rest Buttons

Rotary Live Centers

Q-C ENGINEERING PRODUCTS

6666 Tireman Avenue Detroit, Michigan

Detail of Blade Adjustment

INSTANTLY ADJUSTABLE IN LINE OF WEAR

IN O K Milling Cutters the blades (which are separate cutting units) are driven into serrated mating slots in the body. There they lock automatically and positively, without pins, wedges or set screws — yet are instantly adjustable in line of wear. This means that these cutters can always be kept up to size, making it unnecessary to relegate them to smaller cutting in order to salvage their value. Another advantage is that specially ground blades can be used interchangeably in the same body — a flexibility unknown to solid cutters!

If you will describe your work, we will send you the complete O K story as relates to your specific problems. Write for circular.

This highly flexible principle is also available in a full line of single-point cutting tools.

PRODUCTS OF THE OK TOOL COMPANY, SHELTON, CONN., U.S.A.
Originators of the Inserted-Blade Principle

TRADE OK MARK

INSERTED-BLADE METAL CUTTING
TOOL SYSTEM

Eclipse
WHEN QUALITY ENTERS THE PICTURE — HIGH TOOL COSTS DISAPPEAR!
RADIAL DRIVE and MIKRO-LOK make Eclipse tools outstanding because they introduce real economies while actually stepping up quality. They give greater accuracy and reduce "set-up" and "machine-down" time.
LET US SHOW YOU HOW!
ECLIPSE COUNTERBORE CO.
DETROIT, MICHIGAN.

(Continued from page 22)

lutely "tops." Ernie Ekstrom led in community singing. The technical session opened at 8:30 with William Hart speaker of the evening, telling all about "Broaching Tools and Broaching Machines," aided by movie slides. His talk was interesting and very inspiring.

Well, let's turn back the calendar for **Cincinnati's** September meeting which was held at the plant of the Cincinnati Milling Machine Company. Dinner was served after a welcome by F. V. Geier, President of Cincinnati Milling. The technical session consisted of an address by Jerry Burns, Gen. Mgr., Burns Laboratories, Indianapolis, on "Cutting Oils." Pres. Wagner also gave a short talk. There was no meeting in October. Then on November 10th, 110 members and friends met in the lecture room of Ohio Mechanics Institute. Mr. Weber introduced John C. Cotner, Pres., Logansport Machine Co., Logansport, Ind., who gave an illustrated lecture on "Hydraulics and Their Application to Machine Tools." Lt. Commander Bowman of the U.S. Navy was introduced as a special guest. After the lecture a light lunch was served with Mr. Nerswick doing noble work at the beer spigot.

Baltimore's December meeting was a dinner and technical session. Speaker of the evening was S. A. Brandenburg of Monarch Machine Tool Co. With the aid of motion pictures he gave a complete history of the lathe, which was

(Continued on Page 45)

WATCH FOR US
Each Month

Self opening die-heads

•

Collapsible Taps

•

Tapping Machines

•

Standard and Special automatic threading and tapping machines

•

Other Tools to Specifications

•

RICKERT - SHAFER
ERIE, PA.

IS FACTORY WORKER THROUGH AT 40?

(Continued from page 41)

especially during this present period when questions of employment are of general concern.

"It is particularly interesting that the figures used are the Census reports dealing with unskilled and semi-skilled labor, omitting the craftsmen whose skill leaves them far less to fear from the effect of age upon their employability.

Machines Add to Value of Experience

"As to the automobile industry, these findings support our belief that the effect of mass production methods and the intensive mechanization which is necessary in order to obtain a better product at lower prices, does not displace older workers but rather places an added value upon their experience. Machines worth thousands of dollars, even though almost automatic, cannot be placed in charge of men with no knowledge of automobile work, and efficiency in all operations can only come with practice. . . .

" . . . The records for the same 75,000 men employed in 14 automobile plants during this period showed that annual earnings increased steadily by age groups with the maximum being attained between the ages of 55 and 60. . . ."

According to the above reports the group receiving the highest earnings in the highly mechanized automotive industry is 20 years older than the highest earning group in industry in general. Machinery is increasing the earning capacity of the man past 40.

However, there are some jobs in high production plants that still require the brawn and endurance of the younger man. They are getting fewer every year. Horsepower is cheaper.

My humble opinion is, if any particular age group has a problem greater than some other age group in this marvelous land of ours it's the man just being weaned from the warmth of his father's fireside to face a world in which most of the wealth is in the hands of the man past 40. He'll find nearly every worthwhile job occupied by a selfish old fogey between 45 and 80 who does not believe youth must be served. It has been this way throughout history and it looks mighty good to me. I'm past 40.

CHAPTER DOINGS

(Continued from page 44)

thoroughly enjoyed.

Pittsburgh had an interesting meeting in December. Their speaker was Geo. Mencke, Vascoloy Remet Corp., who spoke on "Machinability of Metals." Among their guests were R. T. Palmer of West Hartford, Walter Sceeles from East Providence, and William Knapp of Rockford, Illinois. Understand Dinger is still trying to diet. The entertainment committee announced a Christmas party would be held December 16th at Fort Pitt Hotel—and was it a party. Hats, Horns, Tools and emory stoves, etc., for all as they entered. Cards of all kinds were enjoyed, such as Flich, Old Maid, 500, Bridge, Red Dog and Poker. Bill Schott was a triple threat man in poker. He threatened to win three times.

Central Pa. Chapter No. 22 is located at York, Pa., so your editor has been told. Am beginning to wonder just where York is located?

NEW EQUIPMENT

(Continued from page 38)

that it is held underneath the fixture table rather than on top of it; fully enclosed motors throughout, and complete electrification with push button control, synchronization of all movements by limit switches and relays, and built in wiring and control panel.

The machine performs the following operations:

Station 1: Load and Unload.
Station 2: Drill 2—$\frac{5}{16}$" holes from above, and 1—$\frac{33}{64}$" hole from below.
Station 3: Counterbore 2 $\frac{.4370}{.4385}$ x $\frac{3}{8}$" deep from above and spotface 1—$\frac{7}{8}$" dia.
Station 4: Core drill $\frac{7}{8}$" diameter @ .15° angle from horizontal.
Station 5: Tap 2—$\frac{5}{8}$" x 16 holes from above and 1—$\frac{1}{16}$" x 14 hole from below.

The production obtained, based on an operating efficiency of 85% is 150 per hour.

FLOATS RADIALLY

ZIEGLER

ROLLER DRIVE

Floating Holder

FOR

TAPS — REAMERS
COUNTERBORES
DIE-HEADS

"IT ALWAYS FLOATS"

Compensates for spindle misalignment, eliminating oversized or bell-mouthed holes.

This is no side line with us. We SPECIALIZE in solving tapping or reaming problems and KNOW that our vast experience in this line qualifies us to assist you with YOUR problems.

Holders made to meet all requirements.

Literature upon request.

W. M. ZIEGLER TOOL COMPANY
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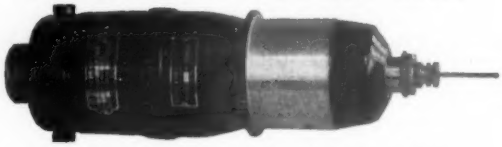
Competent Sales REPRESENTATIVE

is desirous of obtaining sales rights on perishable machine tools or production parts. Can furnish representation for state of Michigan, excellent clientele, 20 years connection automotive industry, 7 years selling experience, excellent references if required.

BOX 505. THE TOOL ENGINEER

GOVRO-NELSON

AUTOMATIC DRILLING UNIT



FAST—COMPACT—CENTRIFUGAL FEED
PROTECTS DRILLS—EASILY ATTACHED

Four models—1800 and 3600 synchronous and 5500—12000 R.P.M. Universal Motors.

HOLE ENGINEERING SERVICE
307 Stormfeltz Loveley Bldg., Detroit, Mich.

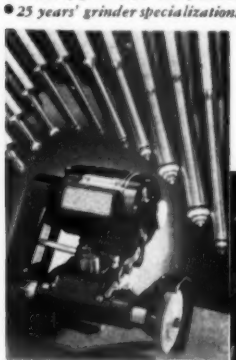
Only DUMORE Gives You ALL OF THESE

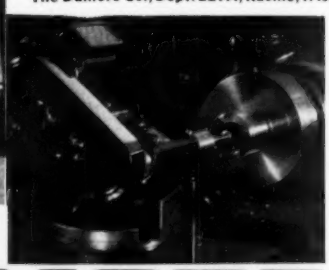
- *Lightweight for easy portability.*
- *Spindle speeds to 42,500 r. p. m.*
- *Wide selection of quills.*
- *A size of grinder for every lathe.*
- *25 years' grinder specialization.*

When you get a Dumore, you get more than one or two special features. For 25 years Dumore engineers have painstakingly developed and improved each part as if it were the most important in the entire grinder assembly. That's why Dumores maintain a precision of .0001" long after ordinary grinders have reached retirement.

Let Dumore tackle your toughest grinding problems. See how you can save time and expense. Ask your distributor or write the factory for a demonstration . . . and 1939 catalog. No obligation.

The Dumore Co., Dept. 229A, Racine, Wis.





No. 5 "Master" Grinder with its 12 quills. At right this versatile tool is in action.

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PRECISION GRINDERS

YOU'LL SAVE TIME

AND TROUBLE . . . BY SPECIFYING NATIONAL TWIST DRILLS, HOBS, REAMERS . . . MILLING CUTTERS, *Special* TOOLS

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The exceptional wearing qualities of the combined carbon and nitrogen case — is further improved by honing the bore to a Superfinish. The black dome head is a distinctive Universal feature. Write for data TODAY

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THE IMPROVED

M-B "SUPERSPEED" AIR GRINDER

THRILLING SPEEDS

AMAZING POWER

STEEL CONSTRUCTION THROUGHOUT.

POSITIVE QUICK ACTION AIR CONTROL VALVE

The ONLY Portable Grinder
With Spindle Speed of 100,000 R.P.M. on 100 Pounds Air Pressure.

Operates on Air Pressures of 40-100 Pounds.

OTHER MODELS—ALSO AIR LINE FILTERS AND AUTOMATIC AIR LINE LUBRICATORS

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Catalog No. 12 contains full information including the low Johansson prices. Mail coupon for a copy to keep on hand at all times.

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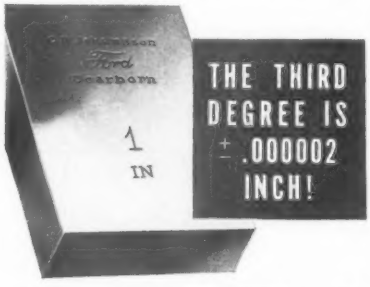

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Accurate to within ±.000004....$8
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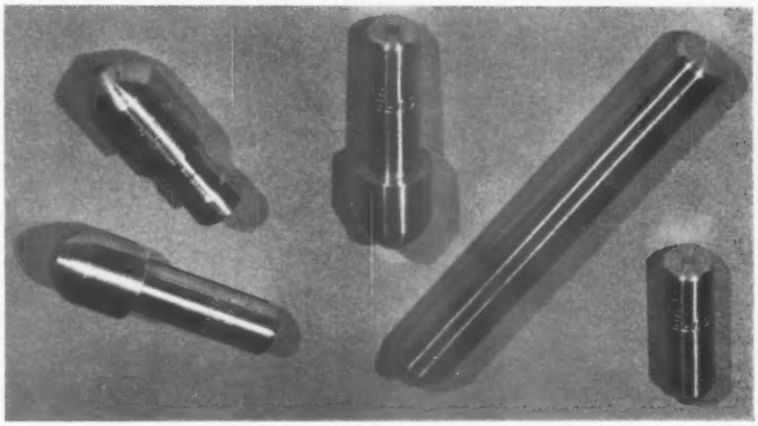
CARDIMOND WHEEL DRESSING TOOLS



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Low Initial Cost
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SAVES THIRTY PER CENT AND MORE OF WHEEL DRESSING COSTS

Try them on a job where you are now buying the more costly grade of diamonds.

ORDER ONE OR MORE TODAY

on a 30-day approval basis and see for yourself. Available in sizes from 1½ karats up.

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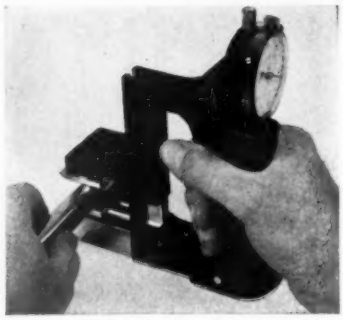

A SNAP GAUGE
that *shows* you the size

You **see** the exact size directly with this snap gauge. Upper jaw is adjustable. Back stop self-centering, and adjustable. Jaws have Tungsten Carbide inserts. 2½" maximum opening. Send for catalog.

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Accuracy Plus Versatility

THE MAUSER VERNIER CALIPER—

A Handy Pocket Tool For Every Tool Engineer

Here is a precision tool that may be used for measuring in 1/1000", 1/128" and millimeters up to 5-5/16" for outside, inside, root and depth dimensions.

May be used in shop and office, in tool room and on drafting board. A universal tool with guaranteed accuracy.

THREE GRADUATIONS

1. Front Scale, Top: 1/16" to read 1/128" on vernier.
2. Front Scale, Bottom: 1/25" to read 1/1000" on vernier.
3. Back Scale: Centimeters and millimeters to read 1/10 mm. on vernier.

OTHER FEATURES

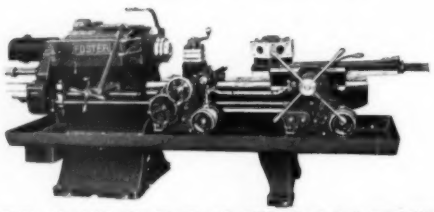
Bevelled Jaws for Root Measurements, Cross Horns for Inside, Easy to Read, Fine Tool Steel, Depth Gage.

SPECIAL OFFER TO TOOL ENGINEERS

This tool will be sent on a 10 days' trial basis to readers of "The Tool Engineer." Send your order in today. If tool is not all we say it is, if you find you cannot use it, you may return it for **full refund.**

George Scherr Co., 132 Lafayette St., New York

FOSTER



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Note the following features:

Bed is equipped with nitrided hardened vee ways; also leveling blocks for quick and accurate leveling of machine.
Lapped helical geared headstock.
Center bearing support to all shafts.
Quick spindle speed changes.
Reverse to spindle only, and not entire gear train.
Cluster gear mounted on ball bearings.
Spindle brake.
Power feeds are dial selected and direct reading.
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All apron bearings anti-friction.
Secure circular for complete information.

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Elkhart, Indiana.

USE LAYOUT FLUID

for general machine shop and tool room use on dies, jigs, fixtures, and machined parts. With the use of the die blue layout fluid, you do not have to polish the surface of work. Simply wipe surface fairly clean and brush on.

DRIES INSTANTLY
5 oz. 40c; 1 qt. 90c; 1 gal. $2.50

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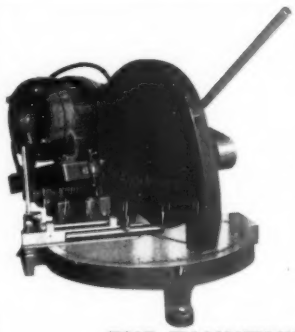

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ABRASIVE CUT-OFF AND MITER MACHINE

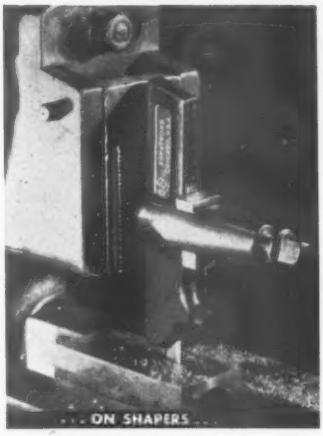
For Bench Use

Instantly cuts any angle from 45° R. to 45° L., bars, tubing or moulding, obtaining a clean ground finish on hard or soft metal. Just the machine for the tool room. Saves Toolmaker's Time. Prices right. Six sizes. Send for Literature.

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

ARMSTRONG

End the
"BOTTLE NECK"
in the tool room
with more
ARMSTRONG
TOOL HOLDERS



Delays in the tool room are felt all the way thru the plant, multiply expense, rob profits. The tool room is no place to be penny wise. For want of the right ARMSTRONG TOOL HOLDER too often means that expensive machines must stand idle and high priced men must stand by.

There are no delays in the tool rooms that employ the Armstrong System of Tool Holders—no waiting for tool steels, for forging and laborious grinding. Work in the tool room starts on the word. Tooling-up is reduced to the selection of the cutter-bit, the tightening of a screw. There are no long breakdowns—both men and machines can account for an hour's work for each working hour.

The Armstrong System of Tool Holders provides holders of over 100 sizes and shapes, holders for every operation on lathes, planers, slotters and shapers. They are permanent, multi-purpose tools that cut cutting costs, that "Save: All Forging, 70% Grinding and 90% High Speed Steel."

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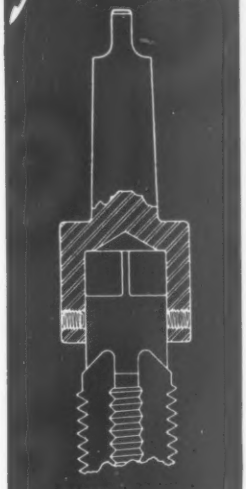
Maximum Accuracy



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LARGE SIZE TAP HOLDER

¾" to 3" Diameter

● Designed for driving taps of large diameters — the Scully-Jones Heavy Duty Tap Holder is of hardened and ground, one-piece construction, assuring lasting performance and convenient operation. The tap is held in position with set screws while the broached, square hole compels a positive drive. An indispensable tool for large tapping. Consult us on your requirements.

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STANDARD and SPECIAL PRODUCTION TOOLS
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PRODUCTION TOOLS

ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOLMAN CO., MANCHESTER, CONNECTICUT

HANDEE TOOL OF 1001 USES

BETTER WORK IN LESS TIME

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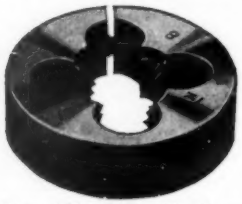

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ADVERTISERS' INDEX

Acme Industrial Co. 50
Armstrong Bros. Tool Co. 49
Barber-Colman Co. 29
Bradford Mach. Tool Co., The. 42
Brown & Sharpe Mfg. Co. 51
Bryant Machinery & Engineering Co. 1
Carboloy Company, Inc. 39
Carpenter Steel Co., The 25
Chicago Wheel & Mfg. Co. 49
Cleereman Machine Tool Co. .. 1
Climax Molybdenum Co. 21
Cushman Chuck Co., The 41
Danly Machine Specialties, Inc. 30
Davis Boring Tool Division 8
Dayton Rogers Mfg. Co. 48
Delta Mfg. Co. 38
Dumore Company, The 46
Eclipse Counterbore Co. 44
Ex-Cell-O Corp. 52
Federal Products Corp. 48
Ford Motor Co., Johansson Div. 47
Foster Machine Co. 48
Gairing Tool Co., The 24
Galland-Henning Mfg. Co. 36
Gammons-Holman Co., The ... 49
Glenzer Co., J. C., The 42
Greenfield Tap & Die Corp. .. 10
Hannifin Mfg. Co. 6
Haynes-Stellite Co. 37
Hole Engineering Service 46
Holo-Krome Screw Corp., The. 5
Jones & Lamson Machine Co. . 27
Knu-Vise Products Co. 42
Logansport Machine, Inc. 45
M-B Products 47
Morse Twist Drill & Mach. Co. 26
National Twist Drill & Tool Co. 46
Norton Co. 31
O K Tool Company, The 43
Potter & Johnston Machine Co. 35
Pratt & Whitney Div. 2
Q-C Engineering Products 43
Rickert-Shafer Co. 44
Scherr Co., Geo. 48
Scully-Jones & Co. 49
Standard Gage Co., Inc. 3
Stanley Works, The 32
Starrett Co., The L. S. 23
Stuart Oil Co., Ltd., D. A. 28
Super Tool Co. 47
Swartz Tool Products Co., Inc. 40
Tannewitz Works, The 48
Tomkins-Johnson Co., The 34
Union Carbide & Carbon Corp. 37
Universal Engineering Co. .. 46, 50
Vacuum Cup Metal Pulley Co., Inc. 50
Victor Machinery Exchange, Inc. 50
Vinco Tool Company 42
Wetmore Reamer Co. 33
Wilson Mechanical Instrument Co., Inc. 41
Zeiss, Inc., Carl 40
Ziegler Tool Co., W. M. 46

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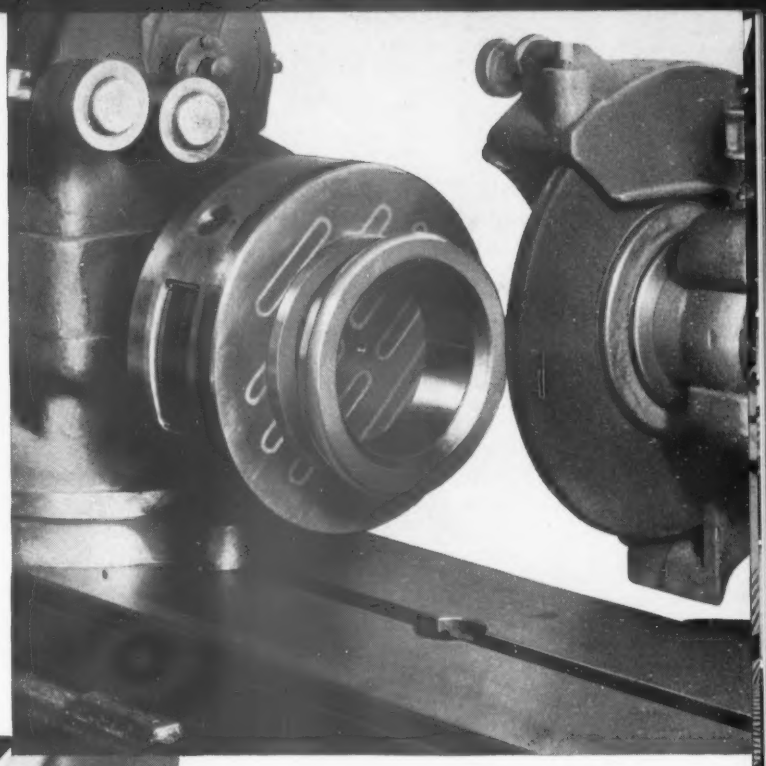

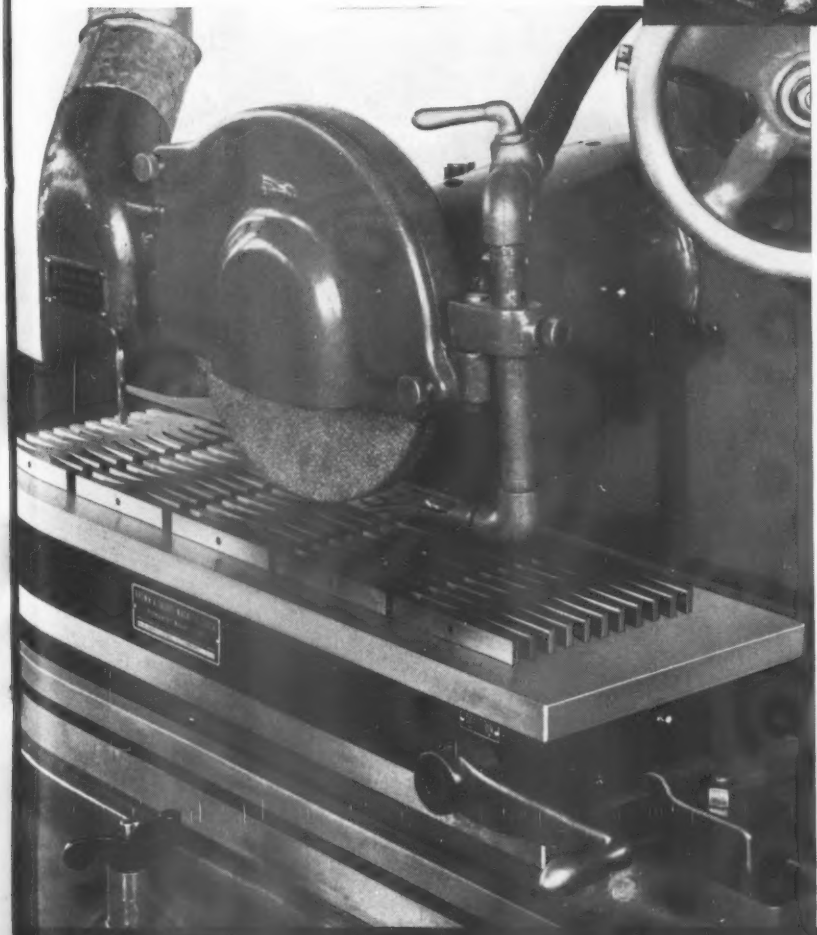

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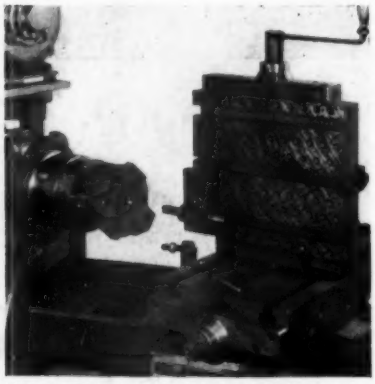
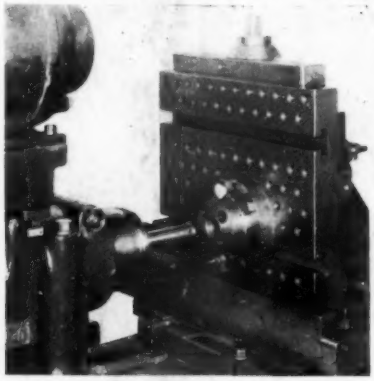
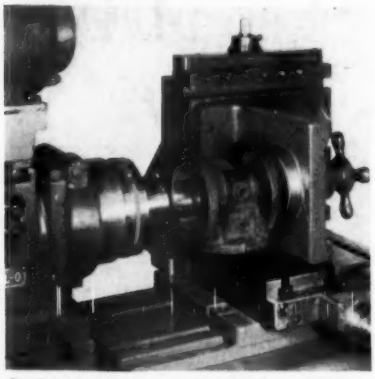


Drop-forged steel valve body held in a three-jaw scroll chuck. The Spindle is set at an angle on the bridge, for taper boring the welded Stellite seat.

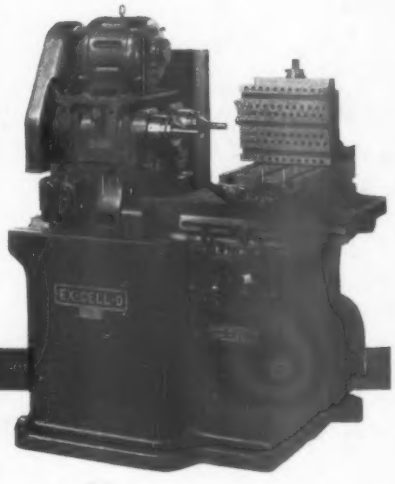


Diesel pump part made of alloy iron held in sub-fixture and clamped with thumb-screws on face of shoulder for straight boring the central hole within .0005".

Taper turning bronze key held on threaded adaptor. Spindle set at 10° included angle on bridge. Turning tool is withdrawn at completion of cut to eliminate draw-back line.



Straight boring bronze bushing in a cast iron valve body, held on the fixture by an expanding arbor. A micrometer adjustment is provided for the boring tool on the Spindle flange.



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